MODEL AIRPLANE NEWS

JULY 1953 25 CENTS

BOEING P-26

GUILLOW'S

Radio controlled model

Trixter BEAM

the newest star in the R/C field

FOR BOTH 465MC AND 27.255MC
"Examination Free" FREQUENCIES

SPECIFICATIONS

Wing Span	50.25"
Wing Chord	8.25"
Effective Area	372"
Body Length	35.25"
Flying Weight	36.5 oz.
Wing Loading	14-16 oz.
Power	.09 to .14
Category	Radio & Sport
Ability	Contest & Trainer

Designed and tested by Lou Andrews

A proven model that easily handles the full equipment of the MacNabb 465 receiver, Bonner compound escapement and motor control units. There is plenty of fuselage space for all radio gear, plus working room for your hands.

The Beam is tops in performance and stability. Designed to protect your investment in R/C equipment, yet you will be pleasantly surprised with its exceptionally graceful lines. See it at your local model store and be the first to fly this latest Lou Andrews design.

$6.95

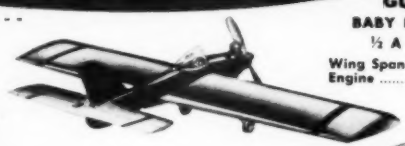
complete with full size plan sheet. Accurate die cut parts. Formed landing gears. Necessary hardware, two colors of covering, and celluloid for windows. Wheels, liquids, receiver, and motor unit not included.

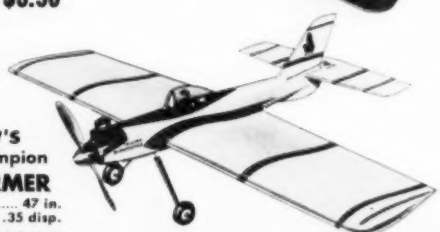
GUILLOW'S TRIXTER Control Line Stunt Models

GUILLOW'S
Trixter PROFILES
CLASS A · B
Wing Span ..... 32 in.
Engine ..... .19 to .35 disp.
$2.50
CLASS B · C
Wing Span ..... 38 in.
Engine ..... .29 to .35 disp.
$3.50

Designed and tested by Lou Andrews - - -

GUILLOW'S
BABY BARNSTORMER
½ A stunt model
Wing Span ..... 23½ in.
Engine ..... .035 to .049 disp.
$2.95





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National Champion
BARNSTORMER
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Engine ..... .23 to .35 disp.
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GUILLOW'S
PROFILE TRAINER
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MODEL AIRPLANE NEWS

Serving Aviaton 24 Years

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CONTENTS

CONSTRUCTION

Daredevil 11
Remarkable Wrangler . . . 16
Pusher 26

ARTICLES

New Stunt Rules 14
Role of the Pusher Canard . . 20
More Power to You 22
Stunt That RC 24

FEATURES

MAN at Work 2
Conrad 5
How to Cover 18
Nighthawk Masterplan . . . 30
Design Detail 32
Engine Review 34
Planes Worth Modeling . . . 36
Japanese Zeke 38

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by William Winter

Every so often, it becomes necessary to check up on the latest Burma Shave "poems" which, as motorists know, are found on posts along the wayside. In collecting a recent batch of Burma Shave gems—for a razor, use a piece of old fuel can ourselves to get money for props for rc, and does that take saving—passed through such places as Danbury, Conn.; Hyde Park, Buffalo, Herkimer, N. Y.; and Erie, Pa., where models were flown, discussed, but not slept. A "field trip." Serious business. Wait until the boss hears about the two rc's in the trunk!

At the first portage, sat up most of the night in the back room of Don Grout's Hobby House, in Danbury. A roving editor, be it understood, is like an army which lives off the land. Ruth G. makes the hamburgers just right. Grout, like most of the local older fliers, is a control line man. Pretty competent crew, these boys, for they mill around five and six in the circle. Being hilly country, free flight is something you read about in MAN—they do have one free flighter on display in a glass case somewhere. It was Grout who, having seen a beep box made for us by Lew Errington, decided rc should be cheaper if his customers were going to take it up, and so invented the compound escapement. Knowing nothing about rc, mind you. So now, along with a few partially reformed ukie addicts, he throws our old Citizen with a Control Research two-tuber off a Connecticut hillside. But his latest is an escapement which gives up to 20 controls, with one neutral, always neutralizing from any control. It's really a selector to work servos or escapements. Convinced him to cut down to several rudder, elevator, and motor positions. You give it one and get right rudder, two for left, three for something else, but nothing happens unless you hold the button. The (*Continued on page* 8)

PLANE ON THE COVER

One of the great all-time favorites, Boeing P-26A is the subject for Jo Kotula's brush this month. This low-wing pursuit, it will be remembered, began the swing to all-metal construction and away from biplane configurations. Powerplant was a 600 hp supercharged Pratt & Whitney Wasp turning a Hamilton Standard metal prop. Wingspan was 27 feet, 11-5/8 inches, wing area 149.5 square feet. Long obsolete when the last war broke out, the P-26A did see some action in the Philippines.

NEXT MONTH'S COVER

Vought's perennial Corsair marks next month's cover. Only just recently dropped from production, this exceedingly tough fighter outlived in usefulness all the other fighters of World War 2. Mostly used by Marines in Pacific fighting in the last war, the Corsair flies mainly ground support today.

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HEH, HEH, NO MORE BROKEN PROPS, JUST SHEAR EFFICIENCY - IF STOUT CAN DO IT, SO CAN CONRAD CONNROD, HAND ME THOSE PLIERS
NEXT DAY....
IT WORKS!!- IT WORKS! OH THE TRUE GENIUS IS SHOWING- NOW!!
BUT WHAT IS IT?
IT'S AN ORNITHOPTER AND LOOK - LOOK - IT'S FLYING!
WHATS AN ORNITHOPTER?
LOOK AT IT GO! IT'S FLYING! IT WORKS!!
LOOKS LIKE IT'S DOING ALL THREE RIGHT OUTA SIGHT...
I UNDERSTAND PROFESSOR FRISBEE SIGHTED A HAIRYCHESTED BARKSCRATCHER JUST YESTERDAY AT 9:03 A.M. - OH BIRD WATCHING IS SUCH GRAND SPORT - GREAT SCOTT!!
SECONDS LATER...
DUCKS DON'T GROWL YOU FOOL, RUN
RRRRRRRRRRFLAP!!!!
DON'T SHOOT SAM YOU MIGHT JUST WOUND IT!
GET THE CHILDREN IN
GET OUTA THE WAY AN' LET A MAN RUN!!
IT COULDN'T BE A HAIRYCHESTED BARKSCRATCHER
RUN!
HEAD FOR THE HILLS - THE TIGERS ARE LOOSE
MOVE OVER!!
LOOK!! THE (PUFF) (PUFF) BRUTE HAS, (PUFF) HAS (GASP) LIT IN THE TREE (WHEEZE) OVER (PUFF) YONDER
HAIRYCHESTED BARK SCRATCHERS (PUFF) DON'T GROWL THOUGH
IT'S A PREHISTORIC THROW-BACK IT'S A, YES, YES, IT'S A CORYVIPEROUS MINGOUTOUS!
IT'S NOT A BARKSCRATCHER?
'TIS NOT - IT'S A BROWN '60

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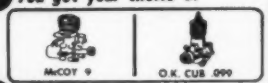

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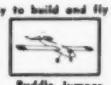

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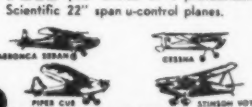

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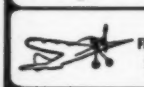

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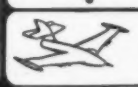

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Man at Work

(Continued from page 2)

whole thing is no more complicated than the Bonner compound deal in our flipper job. With a beep box, it should put a lot of people out of their misery. It adds six ounces to the weight of a small Live Wire.

• • •

Next port of call was the Lorenz's. Ed's been developing a two-tube transmitter for MAN and, of course, this required testing despite the lateness, or earliness, of the hour. This reminds us of an article in an English publication about ways and means of communicating between the guy at the transmitter and guy at the receiver. Calls for much waving of big signal flags—two hands yet, meaning, for example "are you sending," or, "no, I ain't sending." Silly, isn't it? Here is the sensible Lorenz-Winter system. You put an airplane on the kitchen table. Transmitter man takes box outdoors, and walks out through the woods, lighting his way with a flashlight which means, "hold the button," or, "I just fell in the brook." When rudder clicks over in the kitchen, you switch out the room light. Are you receiving? Is there a nice free flight in the house? • • •

But all this was mere warm up. When we pulled into Williamsville, N. Y., just before dark, silent man DeBolt was out flying rc. Testing a big Live Wire which contained two MacNabb sets, one on 27 and other on 465. Elevator and Rudder. The gross weight of this interesting job was still a pound less than that of our own indestructible L. W. which has rudder only. Next four days were a blur of faces, airplanes, places. This is Live Wire heaven—Buffalo and DeB, natch. It's flat country. With the wind that blasts off the lake, it's a wonder they don't go in for model railroads. "D," or "Ace," as these guys call each other—MAN at Work, too, before the weekend was shot—has a quiet hideaway for making models. It's about as big as two clothes closets and contains thirty odd airplanes, about half of them rc, the rest stunt and speed. (His buddy, George Swank, is just as bad!) Also a metal working lathe on which he makes his own speed pistons, etc. His record—holding 60 is practically a home built engine. At all hours of the night, guys come in, walk through the house, and announce, "Saw the light burning, D." Night shift workers going home.

• • •

Had told him we needed a new Cub 14 because of supposed trouble with the old one so he said "Let's hear it run first." No sooner fired it up when came the verdict; wrong prop, wrong fuel, wrong plug. Switched the works and it ran like mad. Now here is a story. During the winter had been using a popular hot fuel, known to be good, and a hot plug which insured starting. The first warm afternoon engine couldn't be tuned, and put out insufficient power to fly. DeB has us put in a cold plug, lower pitch prop for higher revs and better cooling, and a fuel we would not touch with a 40-foot pole. Shows you how silly opinions can get. This stuff did better than the hot fuel. But back in New York, engine didn't want to run well with that combination either. Plugs and fuels really have a terrific effect and must be suited to conditions on hand.

• • •

Sat in on a meeting of the Buffalo Bisons. Much unlike meetings we have seen. No hassle about rules. Everything settled free and easy in no time a-tall. Flying is different too. Not much talking. No one ever explains anything. If, for instance, you said after a bad crack-up that a buzzard flew through the wings, they'd tell you, "heck, you know you don't have the faintest idea what happened." If you bounce one, you say nothing. And nobody thinks anything of it. Did have one hassle with D over

(Continued on page 42)

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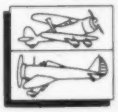

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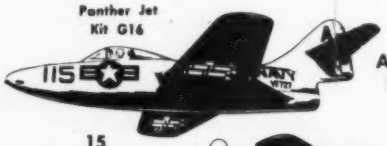

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G-7 Cessna Seaplane

G-6 Long Midget

G-3 Monocoupe

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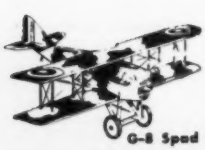
G-10 Thunderjet F-84

G-1 Piper Cub

G-13 F-86 Sabre Jet



G-8 Spad Pursuit

G-9 F-51 Mustang

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DAREDEVIL

For fun or sport, this Half-A free flight is unbeatable. It is a composite of many real ships, with Goodyear racer features. Changes were made wherever performance would benefit.

Looks like a long-winged team racer. Good finish, covering, plus applecheek cowls, sheet-metal gear make it look like million bucks. Jobs like this don't come in kits so give yourself building treat.

by DICK EALY

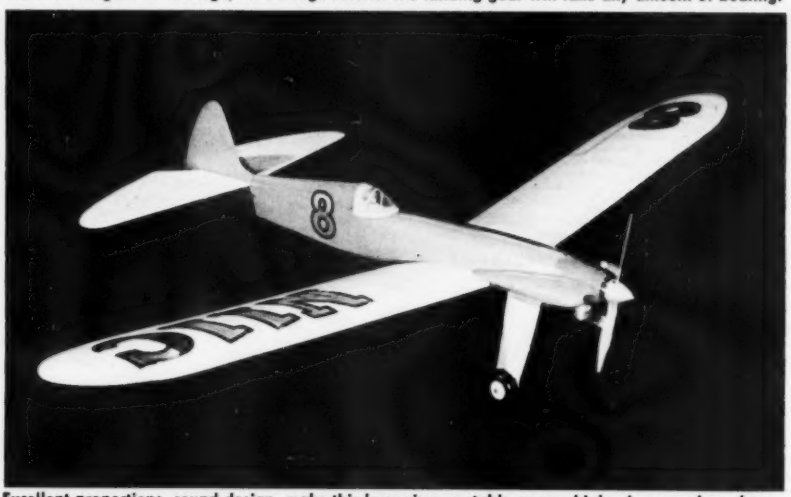
Daredevil is a low-winged, semi-scale, Goodyear Racer, adapted to free flight Half-A gas motors. Build this 40" free flight sport racer for realistic appearance and smooth flying. In days of rubber power you were quite a sport to build and fly a low-winged craft as torque was such a hindrance. The new Half-A gas motors are ideal for our purpose as they have low-pitched props and give little trouble as compared with that found in rubber. If you're anxious to build a low-wing and see how much of a daredevil you are, let's get started on construction.

Cut fuselage side panels from 1/16" hard sheet balsa. Note that these taper from B to A. Next cut B, C, D, E, F, G, and H bulkheads from 1/16" medium sheet balsa and cut 3/16" hard balsa bulkhead behind firewall A. Build fuselage inverted, cementing all bulkheads back to E in place. When cement dries,

crack sides aft of E by running razor blade halfway through first. Pull sides together at rear and cement. Then cement main bulkheads F, G, and H in place, and follow by cementing upper bulkheads E, F, G, and H. Cement 1/16" x 1/8" balsa stringer to them as shown. Bend 1/32" soft sheet balsa (soaked in hot water) over and hold in place with gauze or pins until dry. This piece should be lapped over main side panel and trimmed after drying as it will shrink. Cement it in place last. Cement 1/16" hard sheet balsa bottom from E to rear end and trim edges when dry. Cement 1/16" hard sheet balsa floor between C and E. Note it is placed between the sides. Now cement 3/16" hard sheet balsa reinforcements inside fuselage side panels between B and C. Cement two 3/8" soft sheet balsa sides from A to E in place. Cement top cowl 9/16" x 2-1/4" x 10-3/4" soft balsa to fuselage. Tack cement 3/8" soft balsa bottom as it is removed later. Now cut out 1/16" mahogany plywood firewall and attach tin nut-plate to backside with metal screw or 2-56MS. Make two dural cowl clips as shown and attach to firewall with metal screws. Use sandpaper block to smooth fuselage face and put in one degree left-thrust but no down-thrust. Then cement firewall in place.

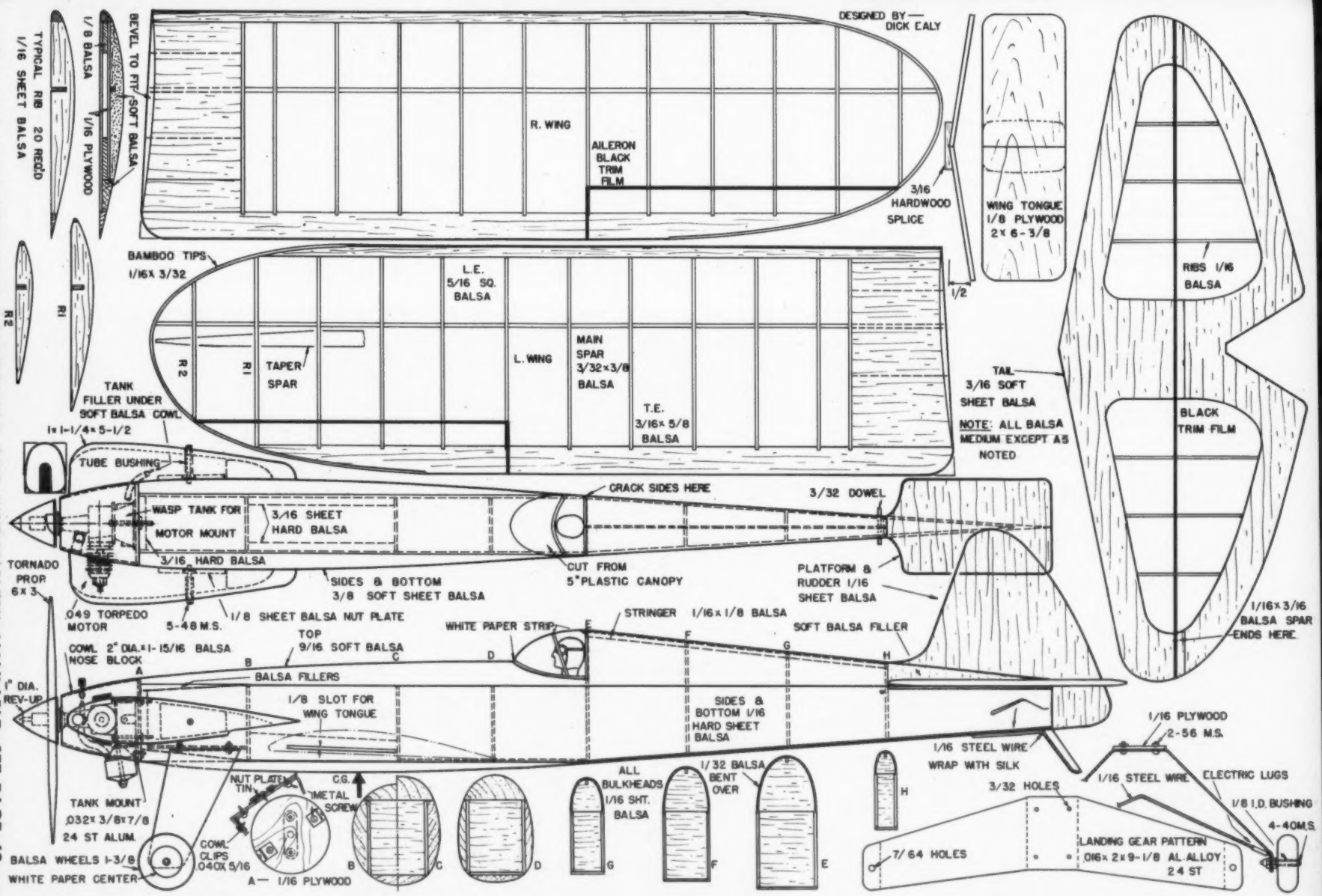
Carve profile and then plan view shown. Round corners. Sand fuselage smooth with 2/0 paper and #400. Remove soft balsa bottom. Make landing gear as shown and attach to 1/16" plywood with four 2-56MS. Slide gear and mount assembly up between sides and bulkheads A and B; cement well. Make 1/8" plywood mahogany tongue for wings, leaving splice off temporarily. Cut slots through soft fuselage side panels at an angle to correspond with that of tongue. Slide tongue in place. The tighter the fit, the better. Now cement hardwood splice on bottom of tongue and cover bottom of fuselage by cementing soft balsa bottom on permanently. Note that splice is rounded on sides so tongue will give in event of wingtip hitting ground. The tongue will produce 3-1/4" dihedral at each tip. Cement 1/16" medium sheet balsa tail platform on fuselage. Insert 3/32" dowel as shown. Make 1/16" wire tailskid and cement to fuselage, using silk over it for reinforcement. Add balsa fairing to skid. The .049 *Torpedo* motor was used to power original model; any other .049 motor may be used. A *Wasp* gas tank makes an excellent motor mount by hack-sawing off the portion that fits into crankcase. File *Torpedo* mounting flange holes to fit *Wasp* tank holes and attach motor with 4-48MS to firewall. A piece of pine block can be substituted for an engine mount. Carve center engine cowl from (*Continued on page* 44)

Good free flight sport designs have got to be able to take it. If you hit ground with this one, wings slide off tongues in fuselage, no damage results. The landing gear will take any amount of beating.



Excellent proportions, sound design, make this low wing as stable as any high wings you have been flying. The *Torp* tank projects but other tanks can be worked out, and any of the small engines OK.

Terrific power of the modern Half-A "mill" is made controllable, flight rendered realistic by use of ample moment arms and "stretched out" lines. Despite all this, construction is not too difficult.



FULL SIZE PLANS FOR BOTH "DAREDEVIL" AND "WRANGLER" AVAILABLE. SEE PAGE 48.

the NEW stunt rules

Trick paint job distinguishes modified *Chief*, flown by Don Jacobs. The powerplant is an Orwick .29.

▼

PRECISION ACROBATIC SCORE SHEET

NAME _____ CONTEST NO. _____

AGE _____ AMA NO. _____ FLIGHT NO. _____

	POOR	AVERAGE	GOOD	EXCELLENT
REALISM	1	2	3	4
FINISH	1	2	3	4
WORKMANSHIP	1	2	3	4

X 7

TOTAL APPEARANCE POINTS

	MAX. PTS.	ERRORS	SCORE
1. STARTING IN ONE MINUTE	5		
2. TAKE-OFF	5		
3. NORMAL LEVEL FLIGHT	5		
4. CLIMB	10		
5. DIVE	10		
6. WING-OVER	10		
7. REVERSE WING OVERS	20		
8. CONSECUTIVE INSIDE LOOPS	20		
9. NORMAL INVERTED FLIGHT	20		
10. CONSECUTIVE OUTSIDE LOOPS	20		
11. SQUARE CORNERED LOOP	20		
12. HORIZONTAL EIGHTS	40		
13. VERTICAL EIGHTS	40		
14. OVERHEAD FIGURE EIGHTS	40		
15. SQUARE CORNERED HORIZONTAL EIGHTS	40		
16. LANDING	10		
PATTERN POINTS	25		
APPEARANCE POINTS			
TOTAL SCORE			

▶ Reverse wing-over? Never heard of it! Not many modelers have, but it is one of the additions to the Precision Acrobatic Pattern for 1953-54 as is square cornered horizontal eight, and normal level flight, normal inverted flight, and square cornered loop, so here is the how and why of the Precision Acrobatic Pattern for the next two years.

Tabulation of voting on the rules change ballot showed 78 percent favored retaining appearance points as part of the precision acrobatic score; 71 percent voted to keep existing pattern but the majority of these favored modifying it to make "The rules more rigid, requiring specific entries into maneuvers" with "more restrictive limits." They also wanted "a greater point breakdown in scoring maneuvers" and an expanded pattern to "include more maneuvers." In addition to these changes a number of revisions have been made in general flying rules to simplify, speed up, and establish consistent operational procedures in acrobatic contests.

An "Official Flight" has been defined as "any flight which has progressed beyond take-off and level flight." If you are doubtful of your plane or engine run after taking off, you may be credited with an attempt providing you do not signal and start your pattern.

"Duration of Flights" has been changed to read five minutes flying time from take-off through landing, excluding starting time, shall be allowed each contestant to accomplish flight pattern. The "duration of flight" shall be starting time as specified in "Number of Flights" or time taken to get model airborne, plus

by EARL WITT

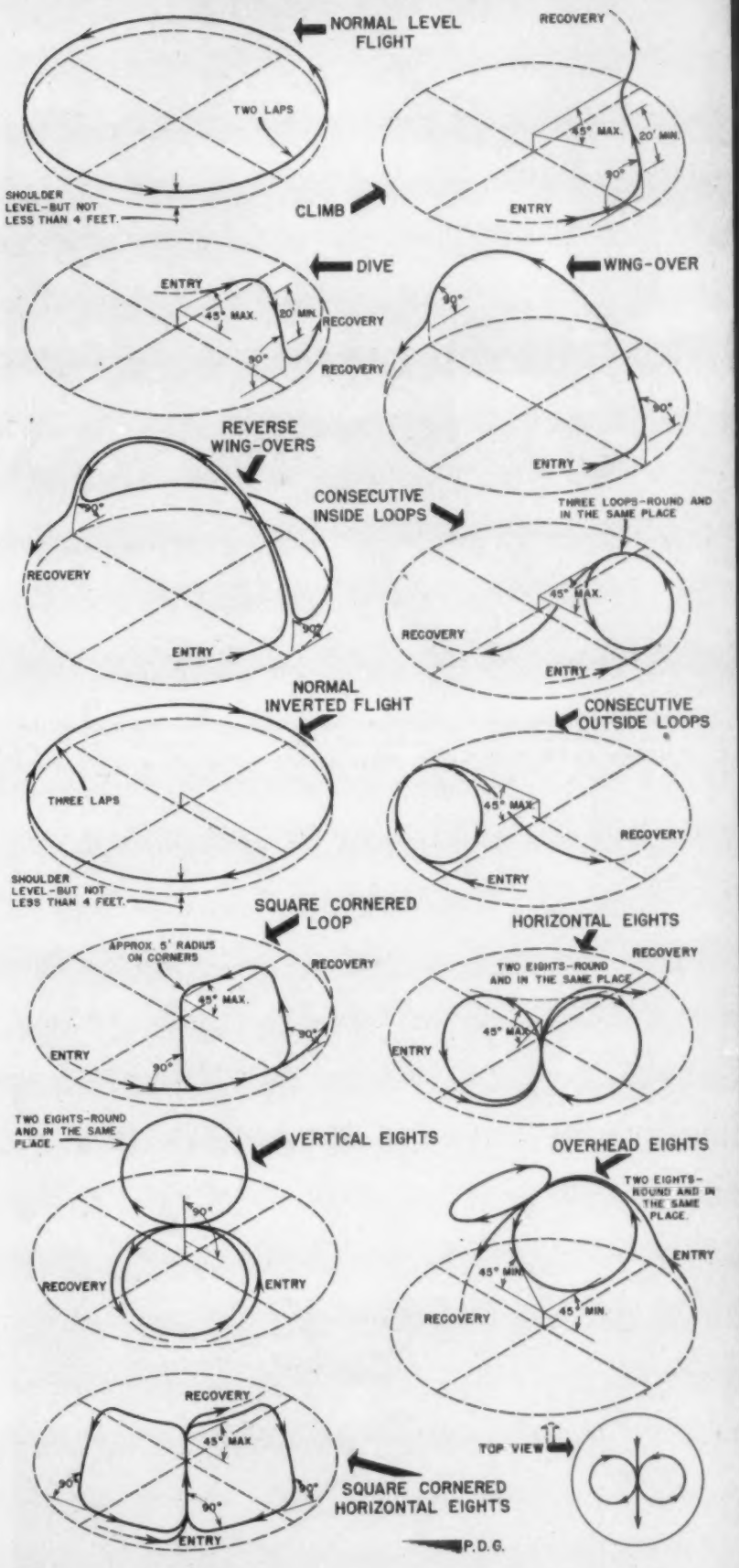
Reverse wing-over is but one of the additions and changes in the precision acrobatic pattern rules that will apply for the next two years. Emphasis is on precision and smooth flying, not on how tight you turn. And a new and totally different scoring system helps the judging.

five minutes. Under these rules you are allowed eight minutes, *only* when you use the entire three minutes starting time to get your model airborne.

Contestant *shall be required* to give a raised arm signal to judges for two laps prior to starting first maneuver of pattern after take-off. Failure to signal start of pattern shall result in no score, contestant being charged with an attempt. This makes a uniform starting signal mandatory.

Judging appearance on a comparative basis, requiring at least one plane to receive maximum points, has been found impractical in contests where it is impossible for the judge to see all entries before awarding points. Appearance judging under new rules is done as models are presented. The judge determines if, in his opinion, model is Poor, Average, Good, or Excellent on each of three points—Excellence of Realism, Finish, and Workmanship. Poor is scored one point, Average—2, Good—3, and Excellent—4, excepting Excellence of workmanship which was felt necessary to obtain excellence of finish and realism. A multiplying factor (7) has been retained to give total possible appearance points (77) the same relative value to flight score as before.

Vertical flight limits on maneuvers have been lowered and specific entries into maneuvers prescribed. No changes have been made in basic maneuvers which will give better fliers serious problems. Maximum inclination of lines permitted for full points in a maneuver has been lowered from 60 to 45 degrees and, in the case (*Continued on page* 46)



the remarkable wrangler

by PETER CHINN

Pete Wright and *Wrangler* V at 1952 Davies Trophy meet, near London. One of Europe's foremost speed and team-race exponents, Wright is British control line champion, took a first and second in speed at FAI World Championships in Belgium. Uses ETA or Dooling, latter shown.

▸ We first met Peter Wright three years ago when he was acting as mechanic to Ted Buxton's winning McCoy .29 job at one of the first British team race events. Since that time, he has been steadily climbing to the top, taking a first and a second in speed at both the 1951 and 1952 F.A.I. World Championship control-line meets in Belgium, and subsequently becoming British Control-line Champion of 1952.

During this same period, Wright, who incidentally is with de Havilland aircraft company, has built a family of five team racers, development culminating in the ship shown here, which has been one of the most successful and certainly fastest team racers of the 1952 season.

The motors favored for these models have been the American Dooling .29 and the British Eta .29. The original model, built in 1949, used a Series I type Eta .29. It did 30 laps (52-1/2 ft. lines) at 74 mph. The second model, powered by the Dooling, boosted speed to 88 mph average, but laps were down to 28. Substituting the Eta, fuel consumption was cut to 32 laps per tank with a speed of 80 mph.

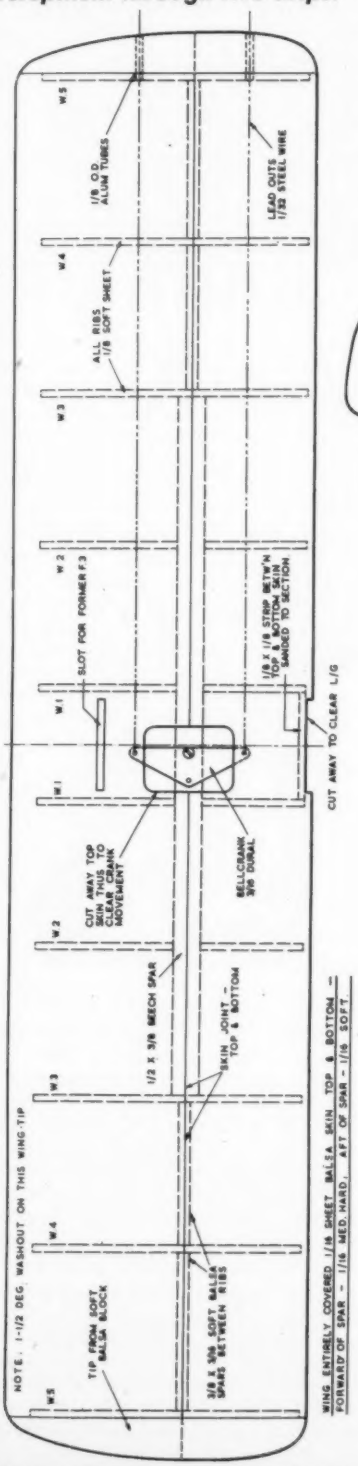
These two models had upright motors and difficulty was experienced in getting a smooth, fast run throughout the flight due to the jet position relative to the tank. *Wrangler III* (1951) therefore had an inverted Dooling, placing jet towards the inside of the circle where centrifugal force would not tend to pressurize feed excessively.

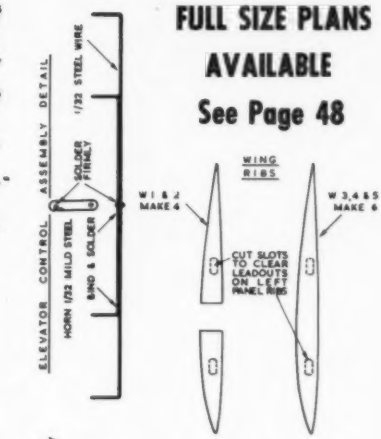
On its second flight, this version turned in 46 laps at an average (timed over 30 laps) of 95 mph. For actual race conditions, however, Wright found his Dooling less easy to re-start during pit-stops than the Eta and a return to the Eta was (*Continued on page* 52)

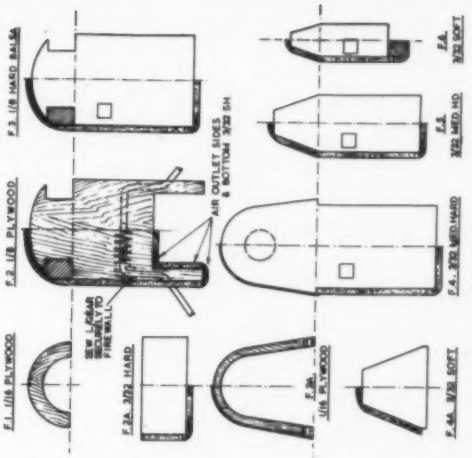
A 90-100 mph team racer that is capable of 2½ miles per tank, one of the fastest and most successful of 1952 season. Dope on fuels, props, development through five ships.

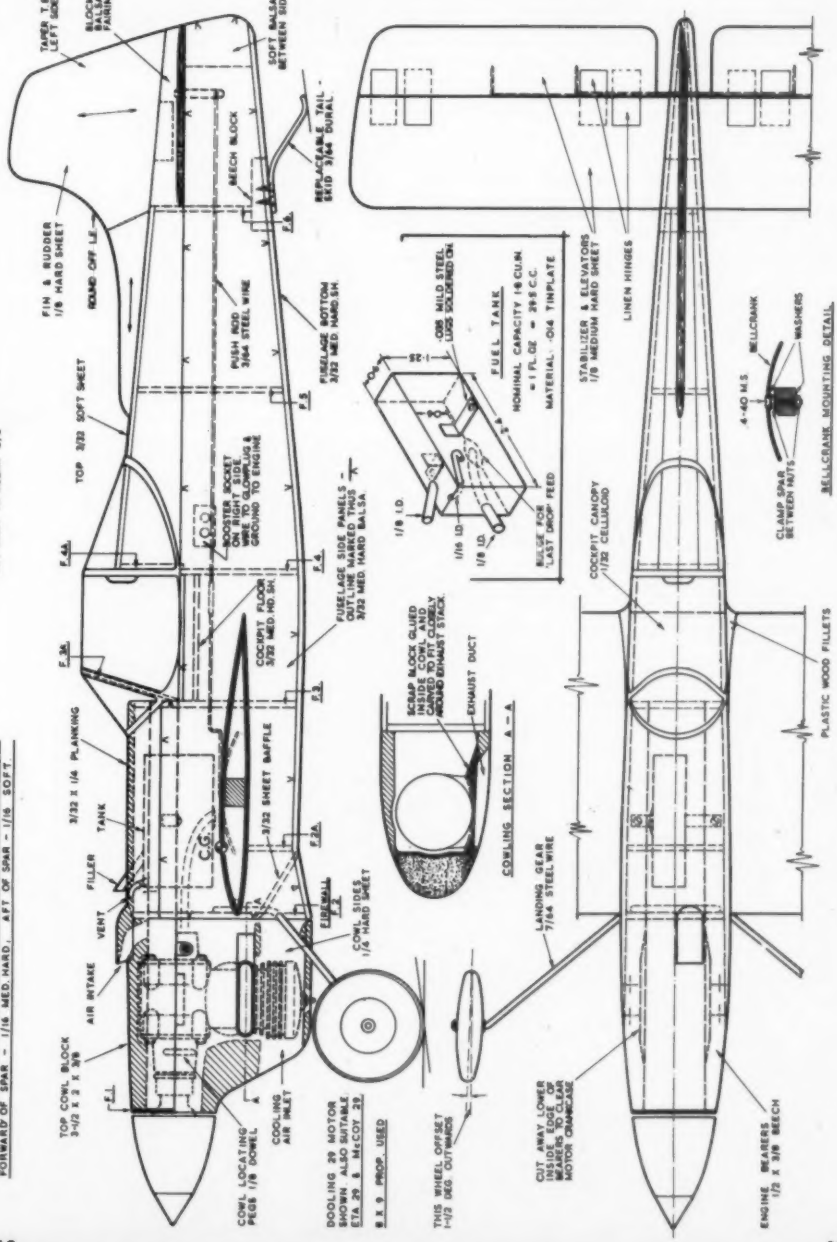
FULL SIZE PLANS AVAILABLE

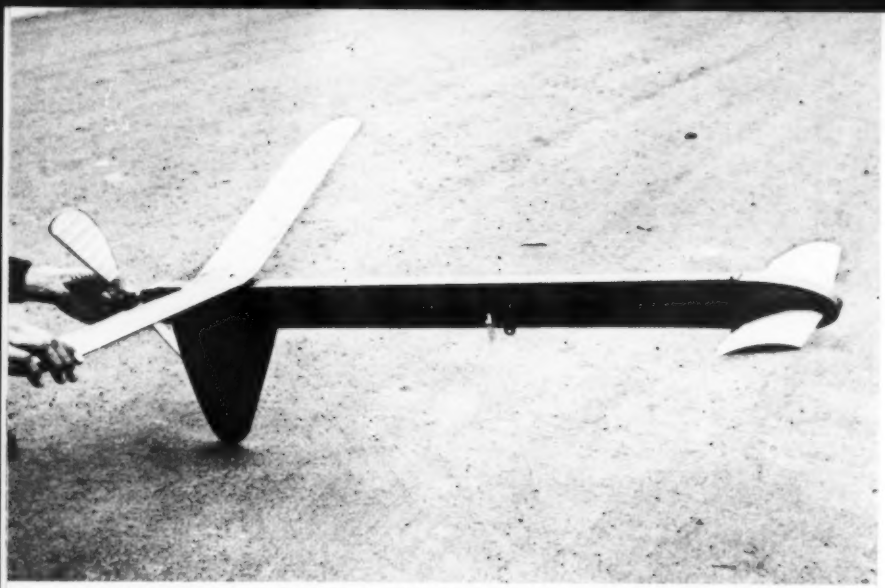
See Page 48


NOTE: 1-1/2 DEG WASHOUT ON THIS WING TIP
TIP FROM SOFT BALSA BLOCK
3/8 X 3/8 SOFT BALSA SPARS BETWEEN RIBS
1/2 X 3/8 BEECH SPAR
SKIN JOINT - TOP & BOTTOM
CUT AWAY TOP SKIN THUS TO CLEAR TANK MOVEMENT
BELLCRANK 3/8 DURAL
SLOT FOR FORMER F3
1/8 O.D. ALUM TUBES
LEAD OUTS 1/32 STEEL WIRE
ALL RIBS 1/8 SOFT SHEET
1/8 X 1/8 STRIP BETW'N TOP & BOTTOM SKIN SANDED TO SECTION
CUT AWAY TO CLEAR L/G
WING ENTIRELY COVERED 1/16 SHEET BALSA SKIN TOP & BOTTOM - FORWARD OF SPAR - 1/16 MED. HARD, AFT OF SPAR - 1/16 SOFT


ELEVATOR CONTROL ASSEMBLY DETAIL
1/32 STEEL WIRE
SOLDER FIRMLY
HORN 1/32 MILD STEEL
BIND & SOLDER
W1 & 2 MAKE 4
WING RIBS
W 3,4 & 5 MAKE 6
CUT SLOTS TO CLEAR LEADOUTS ON LEFT PANEL RIBS




TAPER T.E. ON LEFT SIDE ONLY
BLOCK BALSA FAIRING
SOFT BALSA BETWEEN SIDES
FIN & RUDDER 1/8 HARD SHEET
ROUND OFF L.E.
NECK BLOCK
REPLACEABLE TAIL SKID 3/64 DURAL
PUSH ROD 3/64 STEEL WIRE
FUSELAGE BOTTOM 3/32 MED HARD SH.
TOP 3/32 SOFT SHEET
BOOSTER SOCKET ON TOP OF SIDE & GROUND TO ENGINE
FUSELAGE SIDE PANELS - OUTLINE MARKED THUS 3/32 MED. HARD BALSA
COCKPIT FLOOR 3/32 MED. HD. SH.
3/32 X 1/4 PLANKING
FILLER
TANK
VENT
AIR INTAKE
3/32 SHEET BAFFLE
FIREWALL F.1
COWL SIDES 1/4 HARD SHEET
TOP COWL BLOCK 3-1/2 X 2 X 3/8
COWL LOCATING PEGS 1/8 DOWEL
COOLING AIR INLET
COOLING SECTION A-A
SCRAP BLOCK GLUED INSIDE COWL AND SHAPED TO FIT ROUND EXHAUST STACK
EXHAUST DUCT
LANDING GEAR 7/64 STEEL WIRE
THIS WHEEL OFFSET 1-1/2 DEG OUTWARDS
CUT AWAY LOWER INSIDE EDGE OF MOUNTS TO CLEAR MOTOR CRANKCASE
ENGINE BEARERS 1/2 X 3/8 BEECH
COOLING 20 MOTOR SHOWN ALSO SUITABLE ETA 29 & McCOY 29
9 X 9 PROP USED
FUEL TANK
NOMINAL CAPACITY 18 CU.IN. = 1 FL. OZ. = 29.5 C.C.
MATERIAL - .014 TINPLATE
.080 MILD STEEL LUGS SOLDERED ON
1/8 I.D.
1/16 I.D.
BULGE FOR LAST DROP FEED
STABILIZER & ELEVATORS 1/8 MEDIUM HARD SHEET
LINEN HINGES
COCKPIT CANOPY 1/32 CELLULOID
CLAMP SPAR BETWEEN NUTS
4-40 M.S.
BELLCRANK
WASHERS
BELLCRANK MOUNTING DETAIL
PLASTIC WOOD FILLETS

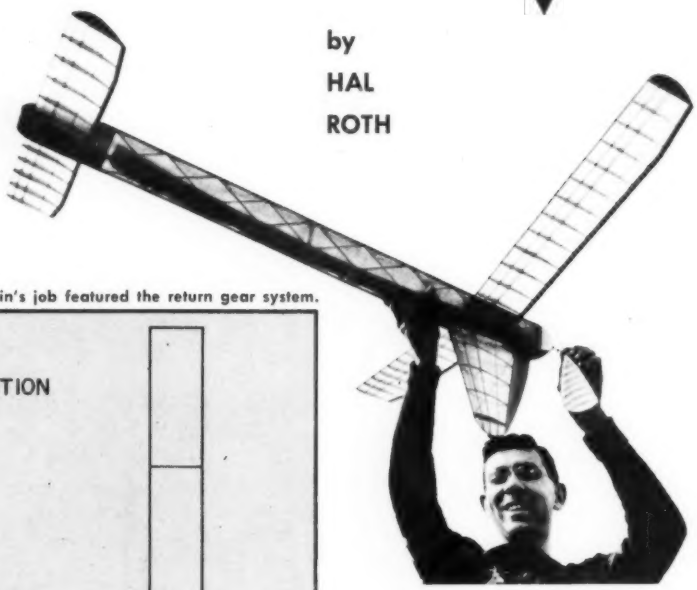


Art Watkin's pusher canard in take-off position. Notice interesting built-up, lefthand propeller.

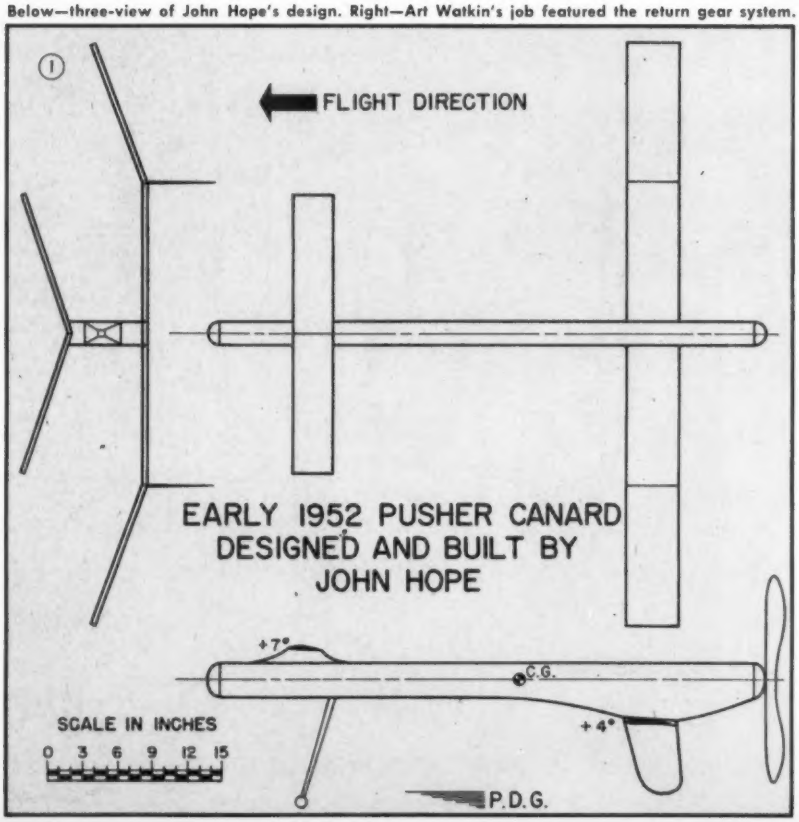
the role of the PUSHER CANARD

Freedom from disastrous stalls, generally good flight characteristics, were obtained in "backwards" Wakefields in Oakland Cloud Duster experiments.

by HAL ROTH



Below—three-view of John Hope's design. Right—Art Watkin's job featured the return gear system.



▸ Early in 1952, a few members of the Oakland *Cloud Dusters* began experimenting with pusher canards. The models' most immediate advantage was freedom from disastrous power stalls: sad ending of many a modern high-powered tractor model.

The ships were designed to Wakefield specifications. The rear-located freewheeling propeller and low fin mounted on the bottom ended propeller damage. The rear-located propeller being safe, built-up propellers were possible.

Flying characteristics are different and a new adventure. Recovery from stalls is immediate and automatic. With a moderate stall (as from misadjustment or a new model) front wing stalls out

After 25-minute contest flight, Hope's first job went out of sight. It has extraordinary glide.

Hope's second canard. Tail fin gives cross section.

first and simply drops. The flight goes right on. The only noticeable effect is a slowing down of flying speed. In a severe stall, model merely rolls out and loses no more altitude than its wingspan. It recovers quickly because wings are located far from the center of weight.

Last and perhaps best, the model type is new and different. Built with a 1953 high-power-to-weight Wakefield set-up, ships fly high, long, and often. Not all problems have been solved but their solutions bring rewarding hours of modeling enjoyment.

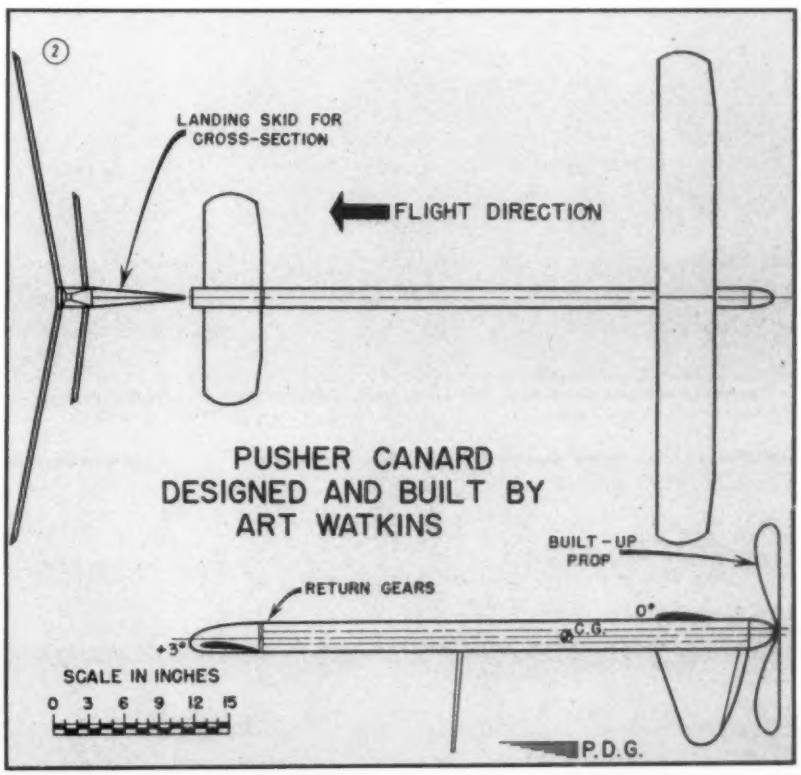
In a normal power stall in a tractor model, propeller thrust force is upward when main wing is stalled out. There is no quick positive recovery force. During the first power burst, tractor often hangs on the propeller, preventing nose from dropping, and slips earthward tail first for 20-30 feet before nose drops and recovery ensues. In the pusher canard, power is boosting upward from *rear* and keeps tail from dropping. The *front* wing stalls first and drops. This happens at once. The pusher continues to fly in a normal attitude, merely slowing down. In practice, this means you can fly a pusher canard under moderate power the first flight with assurance of a good flight. The beginner has a chance.

In a tractor model center of gravity is always within one-inch of the center of rubber motor. With the pusher canard the major structural weights—propeller, fin, and main wing—are located further from the rubber motor center than in the tractor. This means center of gravity is further aft and closer to the propeller in the pusher canard. Thrust adjustments need be larger to be effective.

The first of these models was John Hope's (Drawing 1). Although it was structurally overweight (six-ounce frame with four ounces of power), it climbed ok but glided extraordinarily well. (National Champion Joe Foster was seen with a tape measure admiring the ship.) That the front wing carried more of the load was manifest because the flight was much better than a comparably heavy tractor. This agrees with the theory of the canard. The heavy pusher had good soaring qualities and was lost finally after a long thermal flight.

Hope built a second canard closer to Wakefield weights (five ounces of rubber in a four-ounce frame) with a 20" diameter 32" pitch freewheeling propeller. With 5/16" left-thrust built in, it was flown at full power for the first flight (contest hurry-up) and flew four minutes. Try doing that with a long tractor model!

More experimenting is needed with incidence arrangement. The front wing settings have been varied from three degrees to seven degrees with rear wing set at three degrees less. Not enough testing has been done to properly evaluate effects. (*Continued on page* 40)

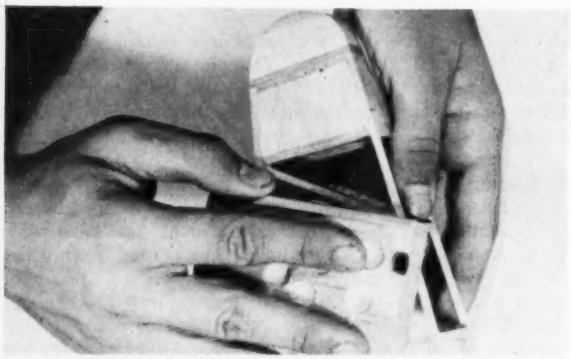


Proof of the pudding is in the flying. How well it flies depends greatly on how well it was covered. Your covering job should look like this.

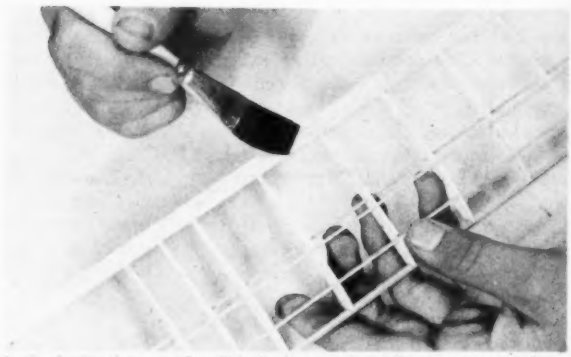
how to cover

by VIRGIL CONE

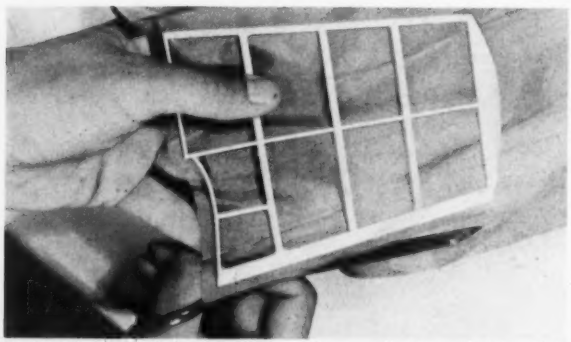
Make like the experts and give your models a break with a neat covering job. Procedure is simple and it takes just as long for poor job.



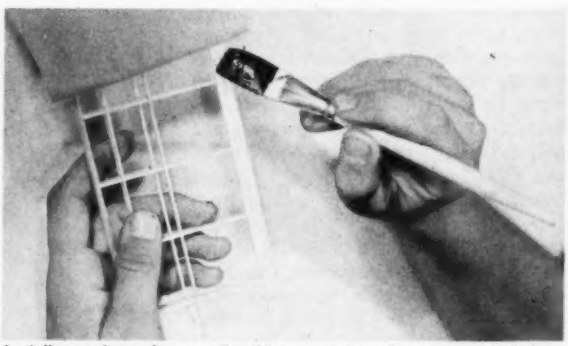
1. Block-sanding finished framework is essential to good covering job.



2. Predoping framework will help the covering adhere to your airplane.

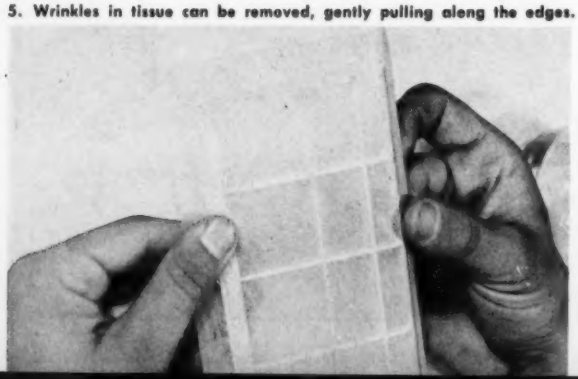


3. Trim the tissue before attaching to framework, leave slight overlap.

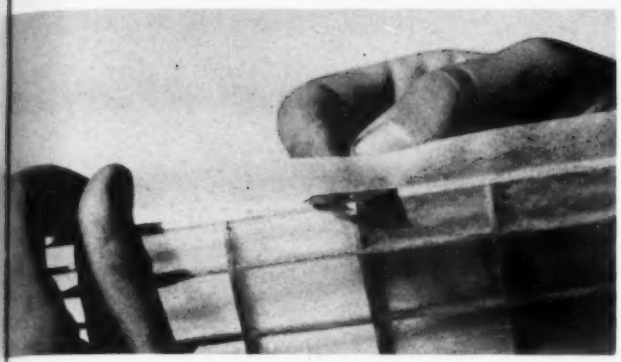


4. Adhere edges of paper. For this use mixture: 1 part cement, 4 dope.

5. Wrinkles in tissue can be removed, gently pulling along the edges.

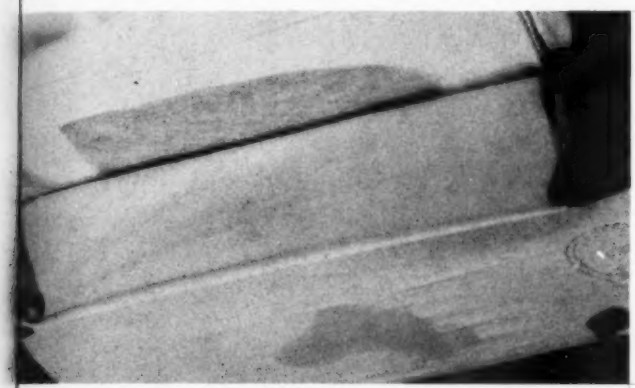


6. Trim surplus tissue by sanding (as shown) or with keen razor blade.

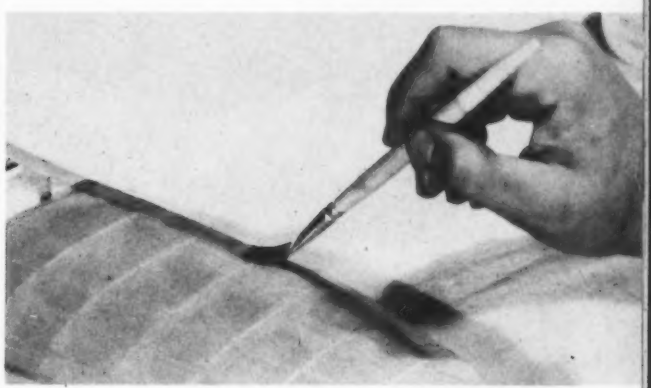


7. Here razor is used to trim tissue. Note how other hand holds material.

8. Tissue should be shrunk with water spray, allowed to dry, then doped.

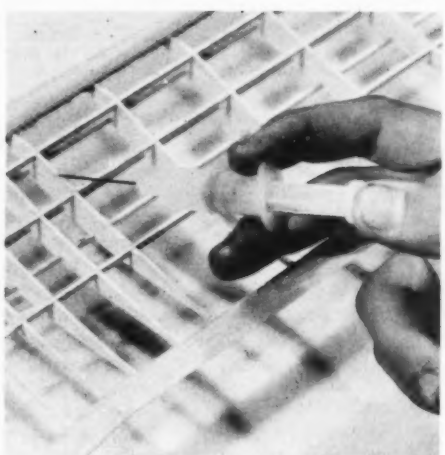


9. Wet coverings—like silk, *Silkspan*—moistened between two wet towels.

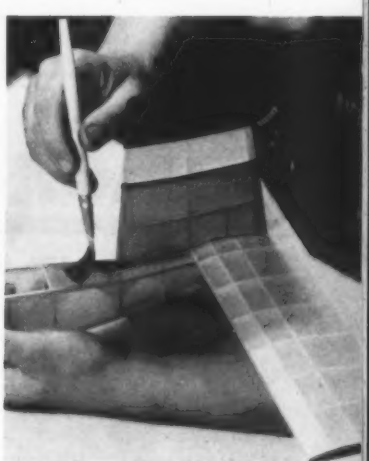


10. When wet covering, brush thinner through edges on predoped frame.

11. Then stretch paper around multiple contours, smooth out wrinkles while covering still wet.



12. Undercambered wings a special problem: coat underside with cement, heavy dope, apply covering.



13. Brush several coats thin dope, allow time for drying between.

14. Draw letters heavy paper, pin over tissue, cut out with razor sliver.

15. Apply tissue trim after first coat, brush final coats over trim.

Ron Popp, of the Merced, California model club, fires up his Class D speed job at the last Nationals. That's an aircraft inertia starter he is using.

MORE POWER TO YOU

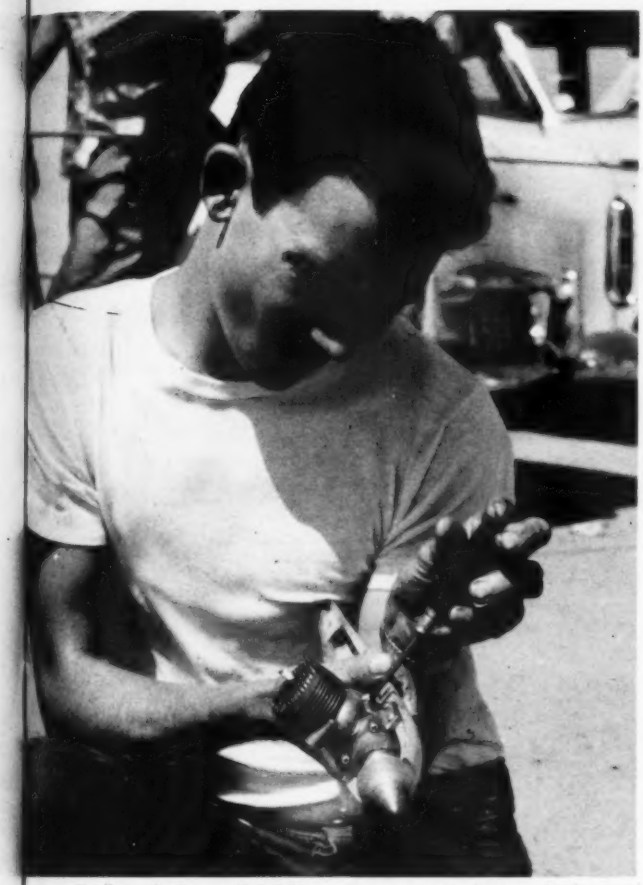
BY TED MARTIN

Tuning the stock glow plug engine is largely a matter of experimenting with those three variables: different glow plugs, the fuels, and compression ratios.

▶ Standard instructions for building and operating a speed model invariably includes the deceptively simple phrase, "Experiment with plugs and fuels to find the best combination for your engine."

To carry this to a definite conclusion would require a fully equipped laboratory and an everlasting engine; however, the purpose of this article is to suggest a simple procedure which will inexpensively provide an approximate answer in a comparatively short time. In order to follow this procedure objectively, it is imperitive to have a thorough understanding of the factors affecting the combustion process in a glow plug engine, because optimum performance from any engine depends upon precise control of burning. When it begins, for instance, how fast it occurs, temperatures reached, and when it finishes.

When a charge of mixture consisting of definite proportions of fuel vapor and air are ignited in the cylinder, we wish them to expand smoothly and rapidly at exactly the right time that the crankthrow is in the rotational position to transmit the greatest leverage to the shaft, thus producing torque. If this expansion occurs too soon, piston will still be too far back on the upstroke and pressure will therefore resist the rotation of the shaft; since pressure cannot be released at the correct time, any mixture which remains unburnt will be subjected to extreme pressure of expanding gases to the point where it will often explode or 'ping.' This detonation, as it is correctly termed, takes place instantaneously and creates tremendous combustion for which the engine is not designed. It therefore imposes excessive strain and severe bearing friction throughout the engine which, as a result,



Jim Geppelt, Corpus Christi, Texas, does not appear happy with the sound of his big Dooling. He's adjusting the needle valve to get those rpm's.

For maximum performance, you've got to have a hot engine in free flight too. Harold Gould, Long Beach, California, checks the timer on his "A" job.

cannot produce full power, overheats, and quickly wears out.

This is the result of serious over-advanced or early ignition and is easily recognized by a sharp metallic crackle above the normal exhaust note of the engine, and also by an unusually bright exhaust glow. An immediate remedy is to open needle valve slightly until crackle disappears. This will slow the rate of combustion by enriching the mixture, and reduce engine wear, but will not allow top performance. Another remedy is addition of extra castor oil to the fuel which will tend to cool the engine and slightly delay burning and expansion. This again will detract from the best possible performance.

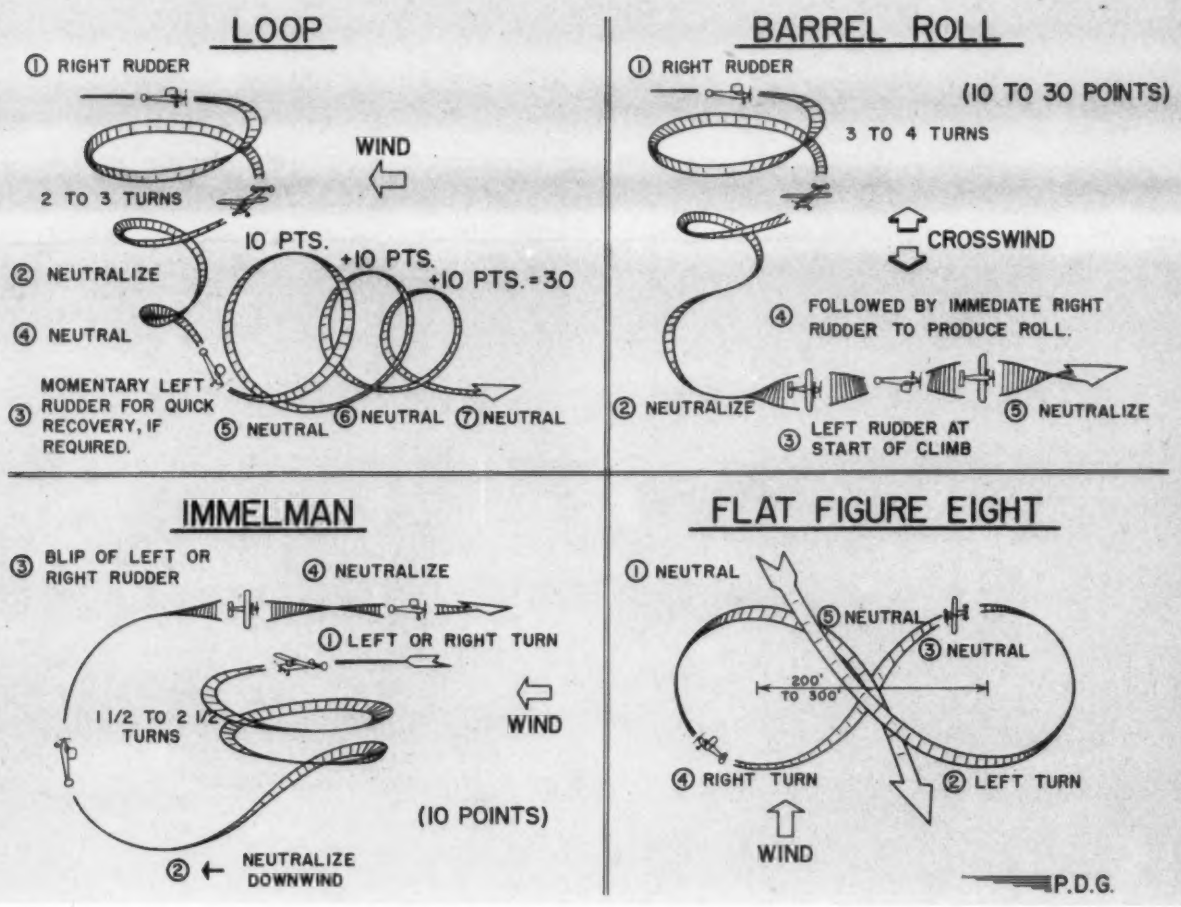
Conversely, if the charge of mixture is ignited and reaches its maximum pressure when piston is well on the downstroke, the exhaust port will open before charge has fully expanded and, again, full power will not be available. This condition may be recognized by an irregular exhaust note, erratic running, uncertain needle adjustment, dirty exhaust, and a very dim exhaust glow. By tuning the needle very lean, using a prop which allows high revs, reducing oil content of fuel to not less than 20 per cent, or adding certain agents to the fuel (to be discussed later) the condition of late or retarded ignition can be materially improved. However, it is unusual for such remedies to liberate the maximum potential power from the engine.

Every production engine is designed to give its best performance under average conditions when employing the specified plug and fuel, and running at the correct rpm. Slight variations are inevitably introduced during manufacture, owing to dimensional tolerances on engine parts and plug filaments and slight differences in fuel ingredients. Also, conditions of atmospheric temperature, pressure and humidity are often far from average where the user lives. For instance, an engine that performs its best in California will not perform so well during a Canadian winter. Also, it may be desirable to run a particular engine either below or above the ideal rpm for different purposes, with consequent variation in charging efficiency. The result of such variations is alteration of the engine's operating temperature, and the prime weakness of a glow plug ignition is that it is so susceptible to such alterations.

The reason for this is that the exact moment of ignition is determined entirely by the internal temperature of the engine. If engine becomes hot, ignition advances usually causing more heat and more advance and eventual loss of power; if engine cools, ignition is retarded, resulting in further cooling and often ultimate stoppage. It is therefore evident that attaining maximum performance from any production engine, discounting radical alterations in design, depends entirely upon minute and precise adjustment of all factors controlling engine temperature.

An important feature to begin with is the provision of some means of maintaining, as far as reasonably possible, a constant outside air temperature, so that having set the needle valve on the ground with engine warm, slipstream will not cool engine excessively in the air. A well designed cowling, as all speed fans know, is a great help. The inlet should be larger than the outlet in order to maintain a slight pressure.

The next thing is to decide what (*Continued on page* 37)

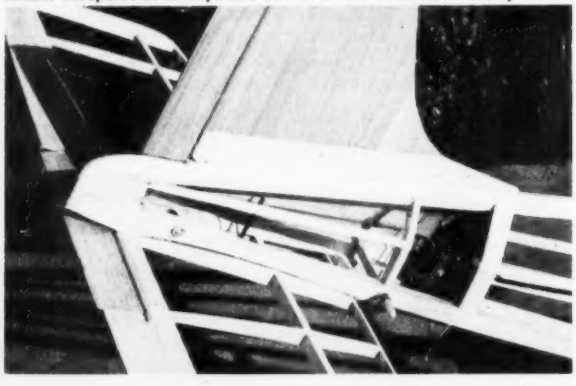


If you plan attending contests, you'll find maneuvers like these are commonplace performances by experienced fliers. But they aren't hard to

Stunt that R. C.

Do you just mill around with that radio job? Why not learn how to do the standard maneuvers? The designer of the CQ shows how it's done.

For drastic stunts, and trim, Brown uses small elevator working off rudder escapement. Always one control or the other but it really works.



▶ It is the dream of every radio control hobbyist first entering the field to flick on the transmitter switch, start engine, taxi ship out to end of a runway, and take off after a long straight run to climb into the blue for a series of spectacular acrobatics including spins, loops, wing-overs, split "S's," barrel rolls, Immelmans and many other stunts made famous by stunt fliers of early aviation days.

Although many of the above stunts are possible, they can be done only after long hours of practice flying and some can be done only by adding additional equipment uncommon to the average R.C. ship as we now know it.

Ninety percent of the R.C. ships now being flown have a single channel receiver controlling one surface, usually rudder, to control direction of flight. It is the skill developed in using this single control that enables the experienced pilot to perform stunts that appear impossible with rudder control alone.

We will attempt to describe methods of control to perform some basic stunts with a single channel radio control of the rudder as the only means at the operator's command to direct flight. Hundreds of practice flights have proved that it is possible to predict and do loops, left and right spins, Immelmans, the split "S," wing-overs and barrel rolls with this type of model. Experience gained from doing these basic maneuvers will eventually lead to the dream conditions of the opening paragraph as pilot's skill develops and improvements are made in R.C. equipment.

There are two basic requirements uncommon to the average radio ship essential for a good R.C. job. The first is two times the power normally required for routine pattern flying; the second is a smaller than usual model of about 50 to 60"

do. One requisite is clean flying ship with good wind penetration.

span. Although addition of power to a six-foot or larger model will permit stunting, the amount of sky required will increase at a terrific rate with each six inches of wing span. Sometimes the change to a smaller diameter low pitch prop will allow engine to develop its maximum horsepower, thereby giving sufficient power to pull airplane completely through a loop. Another difference between the stunt R.C. ship and usual slower pattern flying plane is in amount of rudder throw or deflection or, in some cases, amount of rudder area.

A fast rudder action is a must for good stunting, and some sacrifice must be made to obtain this end. Precision maneuvers such as slow circles and figure eights will have to be accomplished by the "blip method" to preclude having ship enter a diving spiral turn when rudder is held for prolonged periods. If this diving condition is too prevalent, shifting batteries rearward will remedy this condition.

We have flown ships with both single rudder-fin set up and twin rudder-fin set up and have found twin rudders much more effective for the stunt type R.C. model. By removing rudders from direct slip stream, better control is obtained in both "power on" and "power off" flight with rudder effect being more equal under both conditions with the twin rudder ship.

Before going into the more advanced stunts, a few words on the simpler precision maneuvers such as simple 360 degree circle turns to the left and right, simple 90 degree turns to the left and right, the figure "8" and rectangle pattern maneuvers. These precision type of maneuvers require a much lower engine speed and usually much less throw on the rudder. Good clean circles, eights, and rectangle patterns are

BY E. J. BROWN

largely a matter of practice but a few pointers might help.

First, use a large diameter propeller to slow down engine to a point where plane will not climb except when flying straight into the wind. Second, reduce rudder deflection by changing linkage leverage factors to a point where turn is only great enough to make left and right turns in glide. Although above maneuvers can be done under reduced power, cleaner circles and turns can be made in glide. An aid to reduced power is to restrict the intake tube with a wood peg. Drill a 1/8" diameter hole through the peg and fit it into tube above the needle valve. The 1/8" hole will admit enough air for reduced power runs, thereby allowing full circles without the usual spiral dive. If ship still enters a dive during turn, move batteries backward or add a slight amount of incidence to wing by sliding a piece of 1/8" sheet balsa under wing leading edge.

Pilot must learn to predict result of applied rudder or neutralization a few seconds in advance for clean smooth entry into turns or back to straight flight. If ship still persists in diving in the turn, pilot must perfect use of the "blip" method to allow complete 360 degree circles. By this we mean rudder left, off, quickly through right to left, off again and so on. The beep box is a great aid to this method.

Figure eights should be done cross-wind which will soon be a prerequisite in contest competition. The 360 degree turns should follow one another first one direction, and then the other. Learn to fly a rectangle around the transmitter striving for exact 90 degree turns at each corner. All of this practice will lead to better performance in contests and better control in more advanced stunts at higher power with more rudder throw or deflection. Remember, few airplanes are able to do perfect precision maneuvers and good acrobatic stunts too. Learn to control your (*Continued on page* 47)

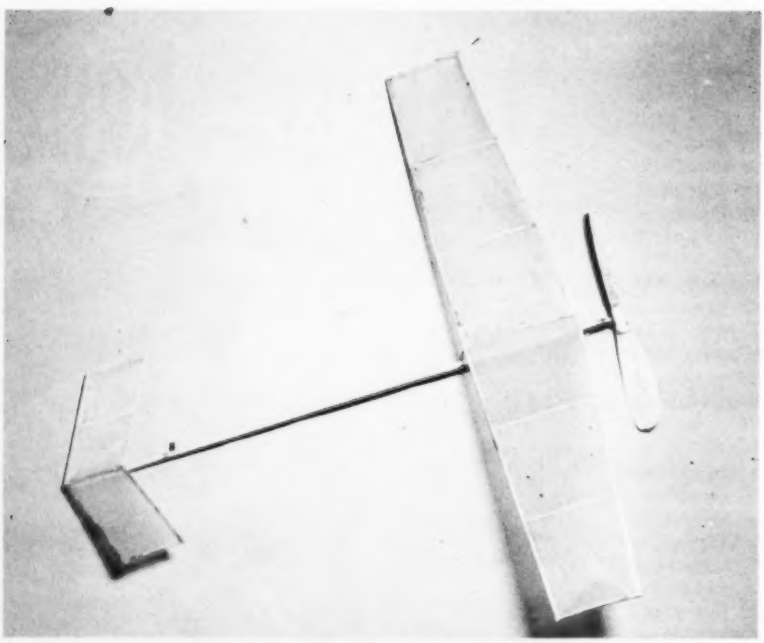
Low and high speed motor will get you out of trouble in a wind and will help in power approaches for getting points. Shown in Oct. 52 M.A.N.

Sturdy enough for outdoor flying on fairly calm days, *Pusher* does up to three minutes in gymnasium or auditorium. (Not during the study periods, please!)

PUSHER

Sound investment: one evening's work gets you a maximum return in fun flying. Good first model for beginners.

by ROBERT H. HAWKINS

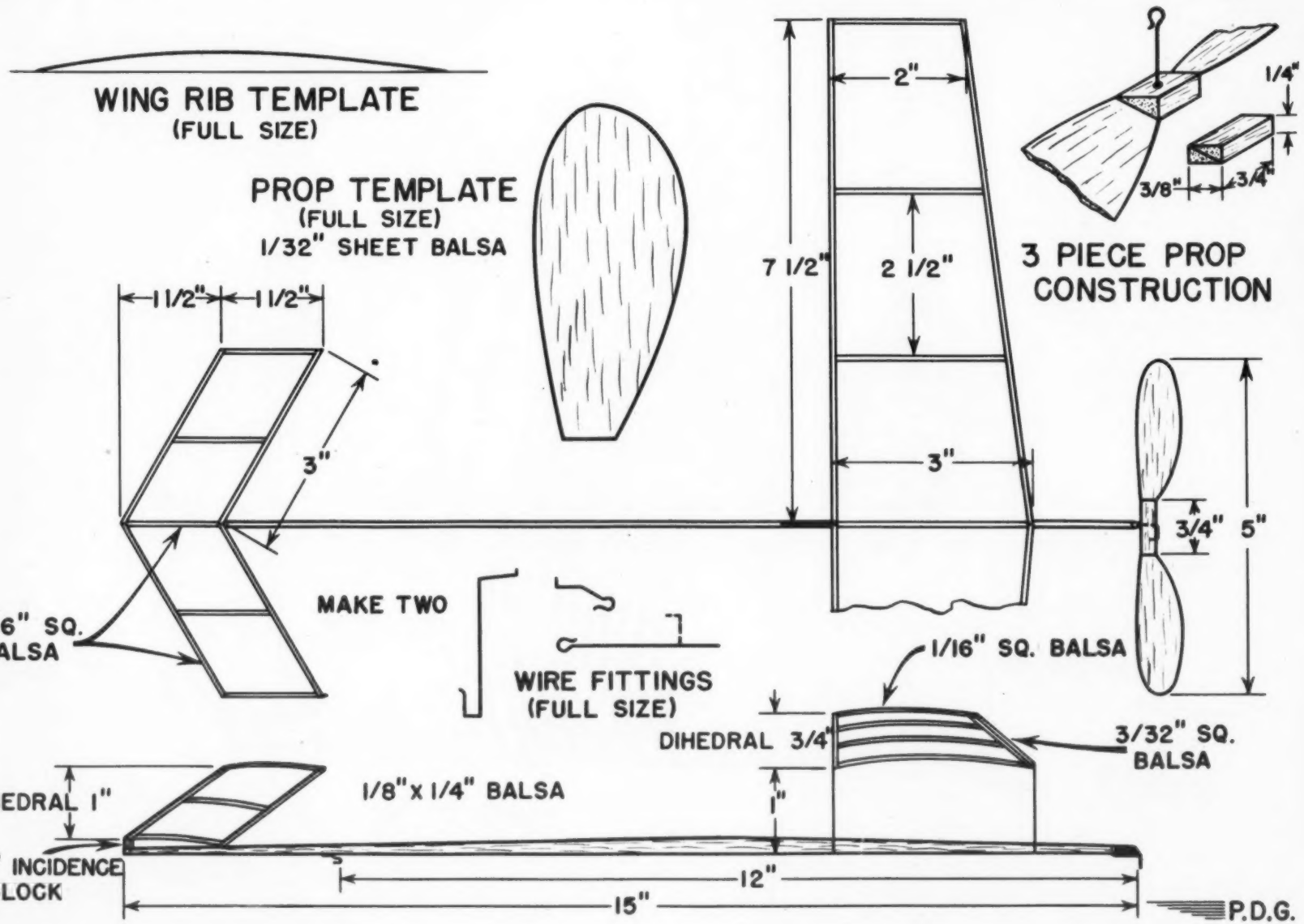


No propeller to carve! Blades are sheet balsa cemented to a block for the hub. Turn is controlled by warping elevator edges up or down. The covering is tissue but be sure not to dope it.

For all around fun you can't beat a pusher. At least that is the opinion of many model builders who first built pushers in the early '30's. In fact, the world's record for hand-launched, indoor endurance models was once held by a pusher.

Shown here is an easily built model for beginners that may introduce you to the fun of flying a pusher, and will also give a good account of itself as a steady flying model. It is constructed sturdily enough to be flown outdoors on calm days; yet is light enough to give flights of from 2-1/2 to 3 minutes in a gymnasium or auditorium. For outdoor flying, use a 13" loop of 1/8" flat brown rubber and for indoor flights a similar loop of 3/32" rubber is sufficient. Let's get to the construction.

The wing spars are two 3/32" square soft balsa pieces 15" long. The ribs are cut from 1/16" sheet balsa as shown. The same metal template used for wing ribs can be used for five ribs in stabilizer. Slice off ribs making them about 1/16" square; then trim trailing edge of each one for taper in wing. After wing is dry, cut wing spars about half way through (*Continued on page* 45)


WING RIB TEMPLATE
(FULL SIZE)
PROP TEMPLATE
(FULL SIZE)
1/32" SHEET BALSA
1 1/2"
1 1/2"
3"
1/16" SQ.
BALSA
MAKE TWO
WIRE FITTINGS
(FULL SIZE)
7 1/2"
2"
2 1/2"
3"
1/4"
3/8"
3/4"
3 PIECE PROP
CONSTRUCTION
3/4"
5"
1/16" SQ. BALSA
DIHEDRAL 3/4"
3/32" SQ.
BALSA
DIHEDRAL 1"
1/8"x 1/4" BALSA
1"
1/8" INCIDENCE
BLOCK
12"
15"
P.D.G.

- HALF PINT . . . 39¢
- PINT . . . 75¢
- QUART . . . $1.40

TESTOR CHEMICAL COMPANY

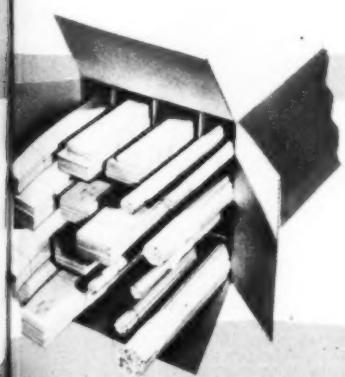
TESTORS "39"

...the outstanding *All-Purpose* fuel for every standard model engine!

TOP POWER *formance*

...for stunt, contest, or just-for-fun flying

By every standard of comparison — easy starting, all-weather performance, power output, quality and quantity of lubrication — Testors "39" is the outstanding all-purpose fuel for all standard model engines. It was developed after many months of research; flight-tested and approved by experienced modelers under the most extreme conditions of stunt, contest, and just-for-fun flying. Try Testors "39" now. See for yourself what top *power*formance really means!



TESTORS BRANDED BALSA

Insist on these other Testors Model Supplies, too

...by name!

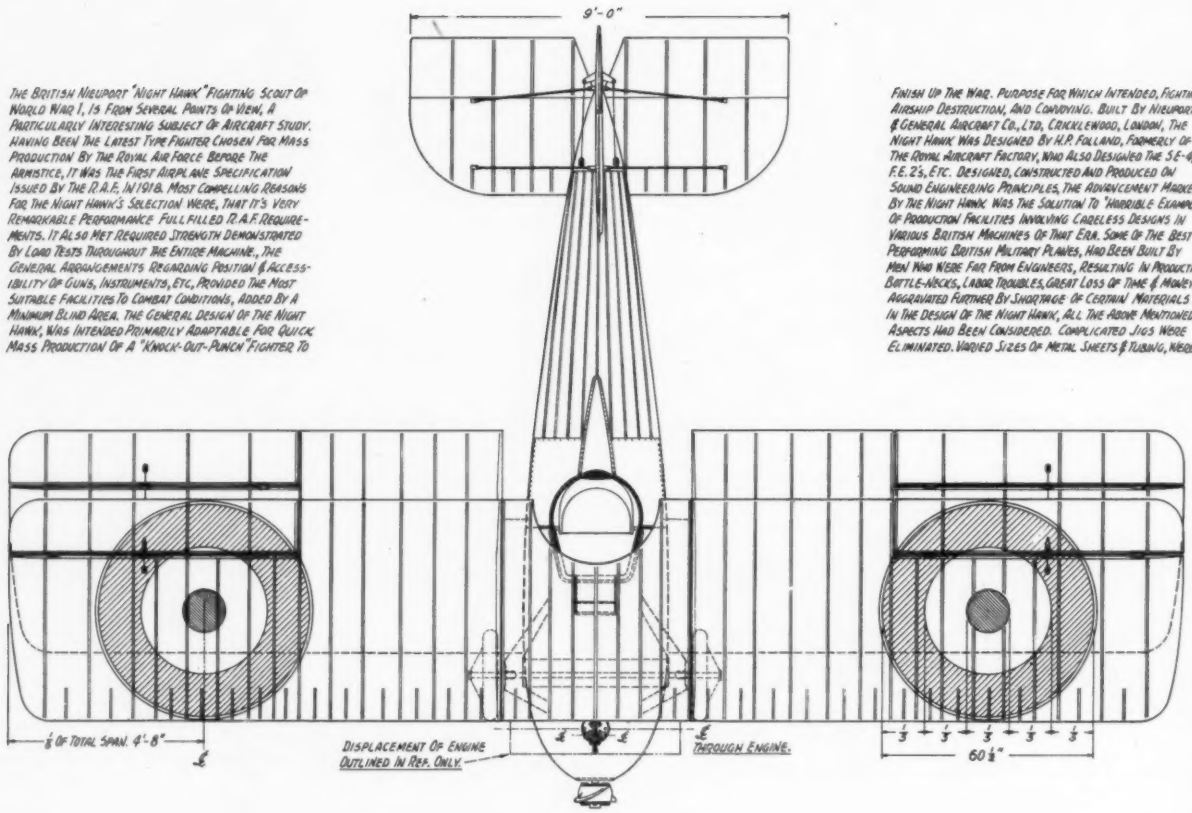
TESTORS DOPE

TESTORS PLAX

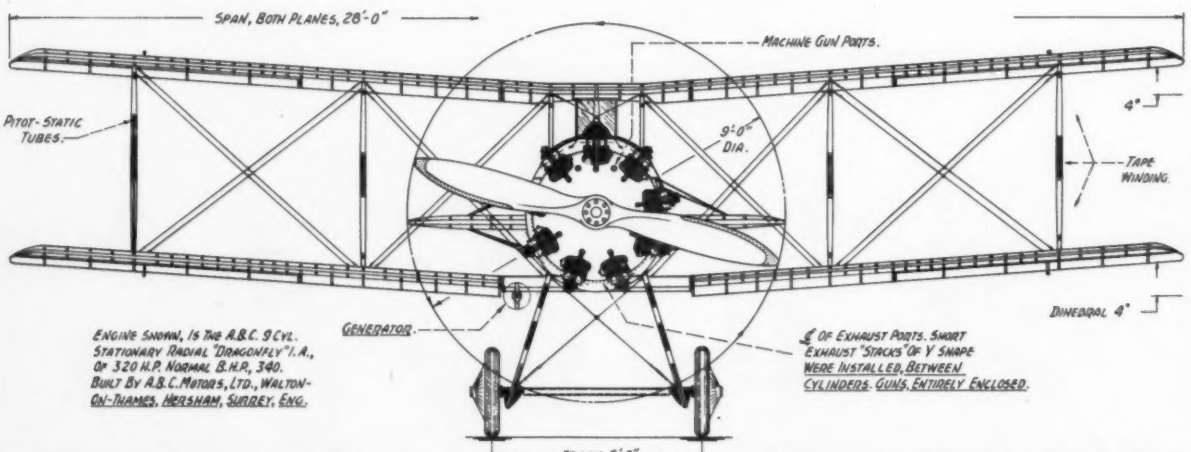
TESTORS MODEL AIRPLANE CEMENT

MY • ROCKFORD, ILLINOIS

The British Nieuport "Night Hawk" Fighting Scout Of World War I, Is From Several Points Of View, A Particularly Interesting Subject Of Aircraft Study. Having Been The Latest Type Fighter Chosen For Mass Production By The Royal Air Force Before The Armistice, It Was The First Airplane Specification Issued By The R.A.F. In 1918. Most Compelling Reasons For The Night Hawk's Selection Were, That It's Very Remarkable Performance Fulfilled R.A.F. Requirements. It Also Met Required Strength Demonstrated By Load Tests Throughout The Entire Machine., The General Arrangements Regarding Position & Accessibility Of Guns, Instruments, Etc, Provided The Most Suitable Facilities To Combat Conditions, Added By A Minimum Blind Area. The General Design Of The Night Hawk, Was Intended Primarily Adaptable For Quick Mass Production Of A "Knock-Out-Punch" Fighter To



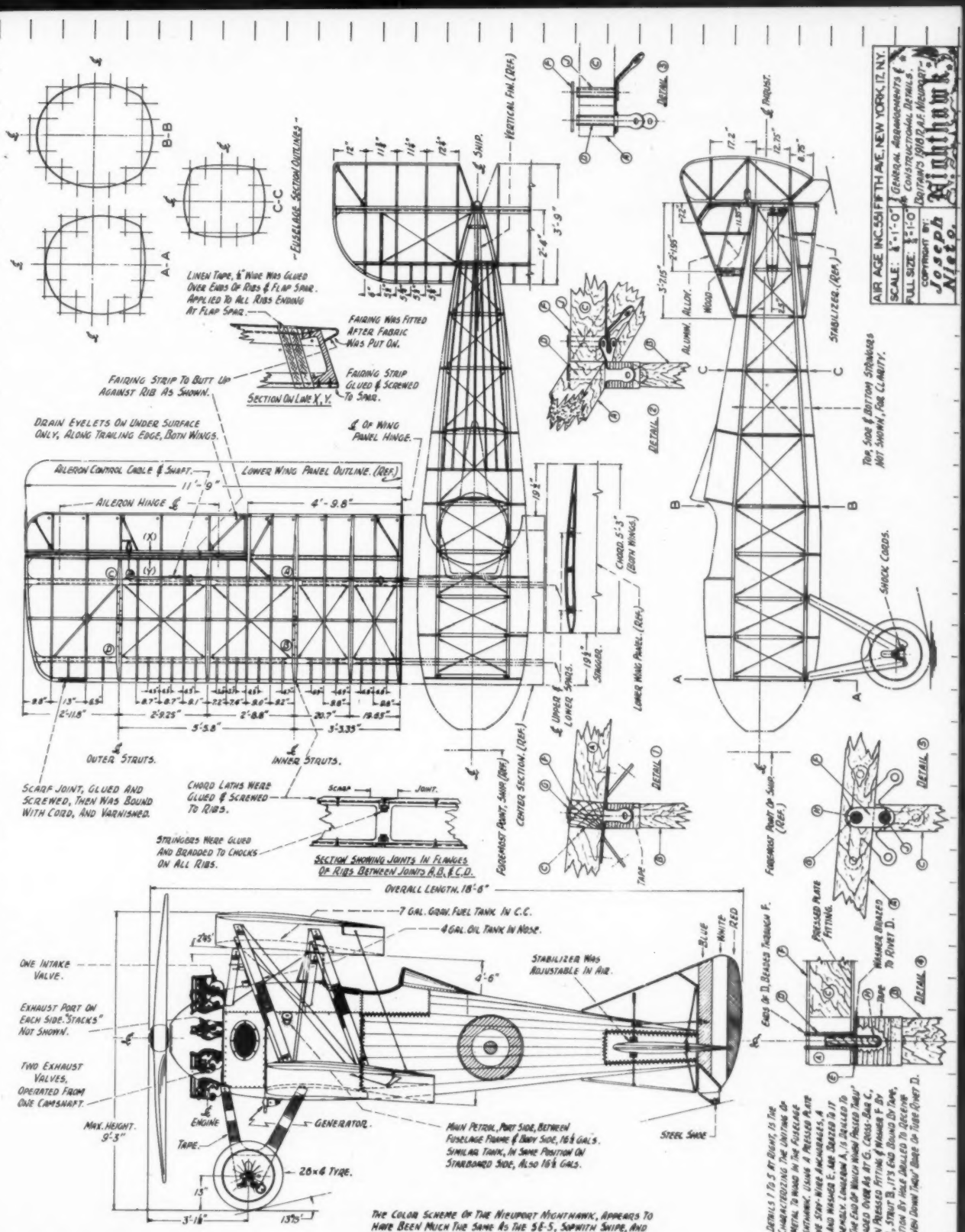
Finish Up The War. Purpose For Which Intended, Fighting, Airship Destruction, And Convoying. Built By Nieuport & General Aircraft Co., Ltd, Cricklewood, London, The Night Hawk Was Designed By H.P. Folland, Formerly Of The Royal Aircraft Factory, Who Also Designed The S.E.4,5, F.E.2b, Etc. Designed, Constructed And Produced On Sound Engineering Principles, The Advancement Marked By The Night Hawk Was The Solution To "Horrible Examples" Of Production Facilities Involving Careless Designs In Various British Machines Of That Era. Some Of The Best Performing British Military Planes, Had Been Built By Men Who Were Far From Engineers, Resulting In Production Bottle-Necks, Labor Troubles, Great Loss Of Time & Money, Aggravated Further By Shortage Of Certain Materials. In The Design Of The Night Hawk, All The Above Mentioned Aspects Had Been Considered. Complicated Jigs Were Eliminated. Varied Sizes Of Metal Sheets & Tubing, Were No Longer A Production Hindrance. Quantities Of Plentiful, Stock Parts & Fittings Used In S.E.5's, Went Into The New Design. Scrap Materials, Residual From Wing Construction, Were Used In The Fuselage & Tail Frames. Briefly, Standardization, Simplicity & Flexibility Of Production Facility Incorporated In The Night Hawk, Was Further Gratified By It's Excellent And Specific Performance. A Bit Late For Front Line Service Before The Armistice Was Signed, The Night Hawk Was Fully Capable Of Carrying On For The R.A.F., Where The S.E.5 And The "Snipe" (Which It Resembled) Had Left Off, And Was After "The Big Fuss". Produced In Considerable Quantity, For The Air Force's Peace Program. As The R.A.F's First Truly Modern, Radial Powered Production Airplane, The Night Hawk Was Powered By A 9 Cyl. 320 H.P. "Dragon-Fly" Aircooled Radial Engine, Giving It A Climb Of App. 1500 F.P.M.,



Engine Shown, Is The A.B.C. 9 Cyl. Stationary Radial "Dragonfly" I.A., Of 320 H.P. Normal B.H.P., 340. Built By A.B.C. Motors, Ltd., Walton-On-Thames, Hersham, Surrey, Eng.

And Top Speed Of 151 M.P.H. With Electrical Clothing Heating Equipment, Oxygen Vaporizer For The Pilot, Three Fuel Tanks, One Oil, Two Automatic Guns, 2000 Rounds Of Ammo, & A Multitude Of Instruments, Fittings & Four 20 Lb. Bombs, She Could Climb To 20000 Feet In 25 Min. Specifications: Span, Both Wings, 28'-0". O.A. Length, 18'-6." Max. Height, 9'-3" (Lev. Fl. Pos.) Chord, Both, 63." Incidence, 2½°-3°. Dihedral, Both, 4°. Gap 4'-6". Weights: Empty, 1500 Lbs, Wt. Per H.P. 6.62 Lbs.

Gross, Loaded, 2120 Lbs. Fuel Cap. 40 Gals, Oil, 4 Gals. (Lasting 3 Hrs. @ 20000 Ft.) Performance: Speed, At Sea Level, 151 M.P.H. At 10000, 140 M.P.H. At 20000, 121 M.P.H. Landing, 58 M.P.H. Climb, To 5000, 3 Mins., To 10000, 7 Min, To 20000, 20 Mins. Disposable Load Apart From Fuel, 400 Lbs. Total Area Of Wings, 270 ☐ Total Area Of Tail, 28 ☐ (Additional Reference Available In "Janes All The World's Aircraft" For 1919.)



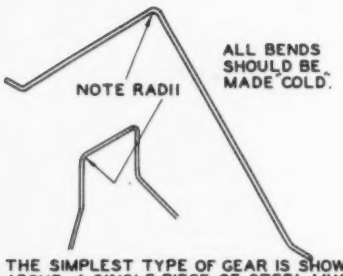
ILLUSTRATED BY DETAILS 1 TO 5 AT RIGHT, IS THE UNIQUE METHOD CHARACTERIZING THE UNIONS OF WOOD TO WOOD & METAL TO WOOD IN THE FUSELAGE OF THE NIEUPORT NIGHTHAWK. LUGS A, PRESSED PLATE FITTING WITH FIVE STUB-RIVET ATTACHMENTS, & FLANGED TUBE D AND WASHER E, ARE BRAZED TO IT TO FACILITATE ASSEMBLY. LONGERON A, IS DRILLED TO RECEIVE TUBE D, THE END OF WHICH WAS FLARED. WASHER E, IS BRAZED OVER AS AT G. CROSS-BAR C, IS HELD BETWEEN PRESSED FITTING & WASHER F BY TUBULAR RIVET J. STRUT B, IS END BOUND OR TAPE, IS FIXED IN POSITION BY WOOD DRILLED TO RECEIVE WOOD PEG H, DRIVEN DOWN THROUGH BRACE & TUBE RIVET D.

THE COLOR SCHEME OF THE NIEUPORT NIGHTHAWK, APPEARS TO HAVE BEEN MUCH THE SAME AS THE SE-5, SOPWITH SNIPE, AND OTHER LAND-BASED BRITISH PURSUITS OF 1918. THE FUSELAGE, TAIL, LANDING GEAR & UPPER WING SURFACES & STRUTS, OLIVE-DRAB (KHAKI.) SURFACES BENEATH WINGS & TAIL, EITHER LIGHT-IVORY OR VERY LIGHT SKY BLUE. OTHER COLORS, AS NOTED.

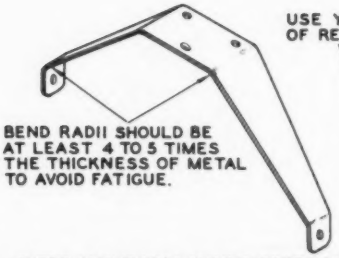
MANY SINCERE THANKS TO WILLIAM KEE, EXPERT SCALE MODEL SPECIALIST, OF INGLEWOOD, CAL., FOR EXTENSIVE AID IN THE PRODUCTION OF THESE DRAWINGS.

design detail

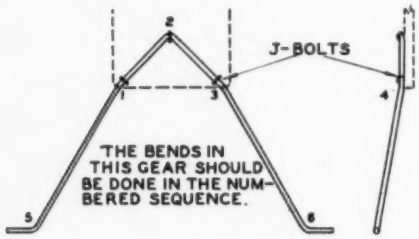
Landing Gear Details



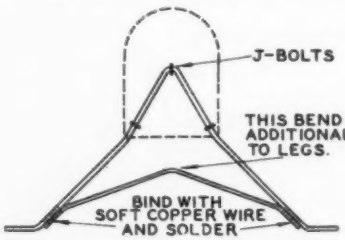
THE SIMPLEST TYPE OF GEAR IS SHOWN ABOVE. A SINGLE PIECE OF STEEL MUSIC WITH A MINIMUM OF BENDS OFFERS THE MOST STRENGTH AND LONGEST SERVICE LIFE. AN ALTERNATE FORM IS SHOWN INSET, WITH SIX BENDS. CHOICE OF EITHER TYPE IS LARGELY DEPENDENT UPON FUSELAGE WIDTH.


BEND RADII SHOULD BE AT LEAST 4 TO 5 TIMES THE THICKNESS OF METAL TO AVOID FATIGUE.
USE YOUR CHOICE OF RETAINERS.
BRASS WASHER
BRASS WASHER SOLDERED TO AXLE.
HEX NUT
SOLDER
WIRE AXLE INCREASES GEAR LIFE AND OFFERS MORE STRENGTH THAN SCREWS.
5 OR 6 RD. HD. STEEL MACH. SCREWS

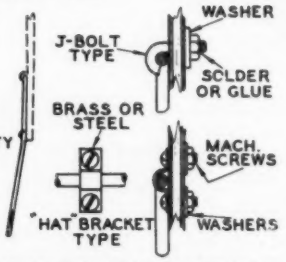
SHEET ALUMINUM LANDING GEARS HAVE BECOME INCREASINGLY POPULAR SINCE THE ADVENT OF TEAM RACING. 61S-T6 OR 24S-T4 ALLOYS SHOULD BE USED—NONE OF THE SOFTER ALLOYS HAVE SUFFICIENT STRENGTH. THE SKETCHES AT THE RIGHT SHOW TWO PRACTICAL MEANS OF ATTACHING THE WHEELS. LANDING GEAR OF THIS TYPE SHOULD BE FASTENED TO A PLYWOOD PLATE IN THE FUSELAGE WITH 3 OR 4 MACHINE SCREWS. CHIEF DISADVANTAGE OF THIS TYPE IS A TENDENCY TO DEVELOP STRESS CRACKS AT THE BEND POINTS AFTER A SHORT TIME. VERY HARD LANDINGS WILL RUIN GEAR OF THIS TYPE.



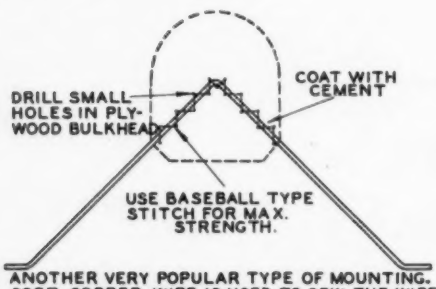
ANOTHER VARIATION OF THE BASIC GEAR SHOWN ABOVE. THIS IS TYPICAL OF THE TYPES OFTEN REQUIRED FOR SCALE MODELS. TO OBTAIN SYMMETRY AND INSURE PROPER TRACKING OF THE WHEELS, GEAR SHOULD BE BENT USING FULL-SIZE SKETCHES AS A GUIDE TO INSURE ACCURACY.



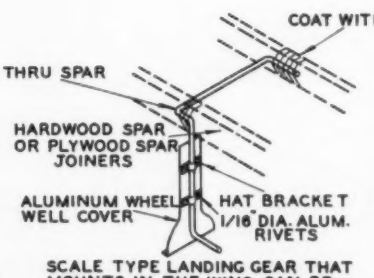
HEAVY STUNT SHIPS OFTEN REQUIRE ADDITIONAL RIGIDITY. THIS MAY BE DONE BY THE ADDITION OF A MUSIC WIRE SPREADER FASTENED BETWEEN THE TWO LEGS. SPREADER MAY BE 1/2 TO 3/4 THE DIA. OF THE MAIN STRUT MATERIAL.



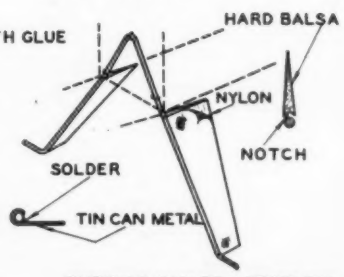
TWO COMMONLY USED METHODS OF WIRE GEAR ATTACHMENT ARE SHOWN. THE J-BOLT IS BY FAR THE MOST POPULAR. ANOTHER COMMON TYPE NOT SHOWN IS THE SPADE BOLT WHICH IS MORE DIFFICULT TO USE.



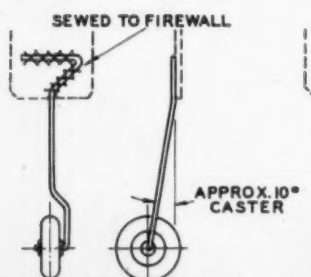
ANOTHER VERY POPULAR TYPE OF MOUNTING. SOFT COPPER WIRE IS USED TO SEW THE WIRE GEAR TO A PLYWOOD FORMER. THIS METHOD IS PARTICULARLY GOOD FOR THE SMALLER SHIPS WHERE THE WIRE DIA. IS LESS THAN 1/8.



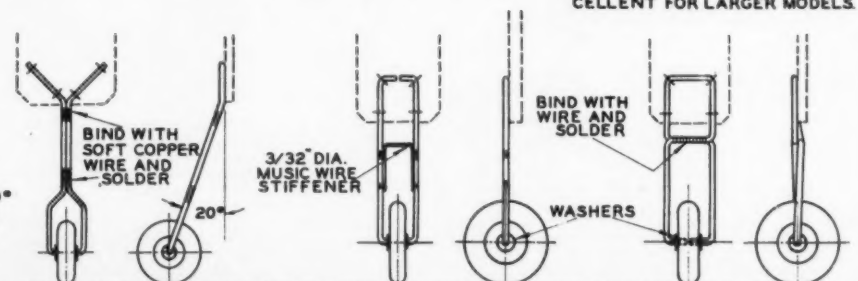
SCALE TYPE LANDING GEAR THAT MOUNTS IN THE WING CAN BE MADE AS SHOWN. THE GEAR SHOULD WRAPPED TO THE FRONT AND REAR SPARS WITH SOFT COPPER WIRE OR FISHLINE AND COATED WITH GLUE.



FAIRINGS CAN BE A PROBLEM. TWO PRACTICAL TYPES ARE SHOWN. FOR SMALLER MODELS HARD BALSA MAY BE CEMENTED TO THE GEAR AND WRAPPED WITH NYLON. TIN CAN METAL SOLDERED TO THE WIRE IS EXCELLENT FOR LARGER MODELS.



TYPICAL SINGLE WHEEL TYPE GEAR CONSTRUCTION FOUND ON FREE-FLIGHT MODELS. THIS TYPE MAY ALSO BE USED FOR NOSE WHEEL ON VERY SMALL TRIKE GEARED RADIO SHIPS.



THREE POPULAR TYPES OF NOSEWHEEL CONSTRUCTION FOUND ON TRICYCLE-GEARED RADIO SHIPS TODAY. 1/8 DIA. MUSIC WIRE IS USED FOR MAX STRENGTH, ADDING 10–20° OF CASTER AS SHOWN IN THE FIRST SKETCH UTILIZES THE SPRING QUALITIES OF THE WIRE TO BEST ADVANTAGE. THE "TORSION BAR" TYPE SHOWN AT THE RIGHT HAS A MUCH SOFTER DAMPENING ACTION THAN OTHER TYPES SHOWN AND OFFERS A GREATER DEFLECTION BEFORE REACHING THE ELASTIC LIMIT OF THE MATERIAL. THIS TYPE IS BECOMING INCREASINGLY POPULAR WITH THE RADIO BOYS.

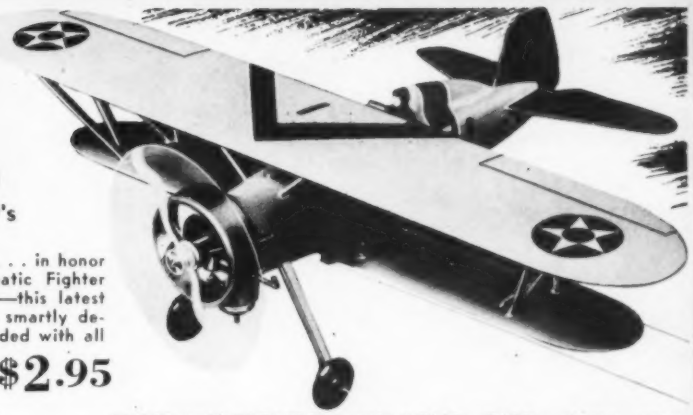
NEW!

SCIENTIFIC

Boeing F4B-4

Realistic Model of the U. S. Navy's Famous Fighter Bi-Plane

It's NEW! It's Exciting! It's our BOEING F4B-4 . . . in honor of the world-renowned "Felix the Cat" Aerobatic Fighter Squadron. Bargain-priced at a low, low $2.95—this latest Scientific control-liner is a real "thriller." It's smartly designed . . . accurately detailed . . . and just loaded with all the quality features you want. The 100% complete kit (super-prefabbed for easy assembly) includes: formed balsa fuselage, wings, tail assembly and struts; metal cowl; rubber wheels; 3-color decals; plastic pilot; etc., etc. **$2.95**



SPAN: 17½" LENGTH: 10½" ENG. DISP: .020 to .074

CURTISS HAWK $2.95
SPAN: 17½" For .020 to .074 Eng. Deluxe U-Control model. 100% complete - with carved balsa fuselage, wings, etc. Easy to assemble.

SPORT RACER $1.50
SPAN: 18" For .020 to .074 Eng. A good U-Control performer at a remarkably low price. Completely prefabbed kit. Easy to assemble.

LITTLE MUSTANG $1.95
SPAN: 18" For .020 to .074 Eng. Features carved balsa fuselage, formed balsa wing, metal parts, etc. U-Control. Prefabricated.

LITTLE SABRE $1.95
SPAN: 18" For .020 to .074 Eng. In honor of the F-86 (Sabre Jet). U-Control model. All parts cut and shaped for easy assembly.

BOEING P-26A $2.95
SPAN: 18" For .020 to .074 Eng. An excellent control-line flyer. Prefabricated kit is complete in every detail . . . all parts finished.

RIVIERA $3.50
For "½A" Eng., Electric Motors
Authentic Chris-Craft replica with a 12" carved balsa hull and brass metal fittings. All parts finished.

SPECIAL $3.50
For "½A" Eng., Electric Motors
Popular Chris-Craft runabout . . . completely prefabbed with carved 12" balsa hull, metal fittings, etc.

Buckeye Jr. Cabin $3.95
For "½A" Eng., Electric Motors
Here's our sleek cabin cruiser. Has a removable balsa cabin, 14" carved balsa hull - 100% complete.

DREAM BOAT $1.95
"½A" Eng., CO_2, or Elec. Motors
Our exclusive aeronautical fin and rudder design. Prefabbed model has 12" carved balsa hull, etc., etc.

BUCKEYE SR. $4.95
LENGTH: 17" For .099 to .29 Eng.
Our deluxe speedboat . . . a real thriller. Features precision finished parts . . . super prefabbed.

F-86 SABRE & F-51 MUSTANG -- Both for $1.50
Our sensational 2-in-1 kit. Contains two complete, realistic profile models. Both control-line flyers take .020 to .074 engines . . . both have 18" wingspans. Not one, but two complete models . . . make and fly both . . . for only $1.50.

BUCKEYE JR. $3.95
LENGTH: 14" For .020 to .074 Eng.
A "beaut" of a speedboat. Prefabbed model is 100% complete—carved balsa hull, brass fittings.

CO_2 SQUIRT $1.50
"½A" Eng., CO_2, or Elec. Motors
Here's an outstanding performer at a tiny price. Kit comes prefabricated for easy assembly.

SEA HAWK $2.50
"½A" Eng., CO_2, or Elec. Motors
Prefabbed. Has a 12" carved balsa hull, brass metal fittings, etc. Aeronautical fin and rudder design.

AERONCA SEDAN $1.95
SPAN: 22" For .020 to .074 Eng.
U-Control, authentic scale model. It's prefabbed . . . with a carved balsa fuselage, formed wing, etc.

CESSNA "170" $1.95
SPAN: 22" For .020 to .074 Eng.
Scale control-line model. Prefabbed kit has formed balsa fuselage and wing, all metal parts, etc., etc.

PIPER CUB $1.95
SPAN: 22" For .020 to .074 Eng.
A U-Control scale replica of the real plane. Prefabbed model has metal cowl, carved fuselage, etc.

STINSON VOYAGER 1.95
SPAN: 22" For .020 to .074 Eng.
Scale model. Carved balsa fuselage, formed wing, aluminum cowl, etc., in the prefabbed kit. U-Control.

½-PINT RACER $2.95
LENGTH: 9" For "½A" Gas. Eng.
Speeds over 40 m.p.h. Features direct wheel drive. Prefabbed kit has formed body, rubber wheels.

LITTLE BIPE $1.50
SPAN: 16" For .020 to .074 Eng.
Carved balsa fuselage bi-plane . . . prefabbed for easy assembly. It's control-line. A real value!

LITTLE DEVIL $1.50
SPAN: 18" For .020 to .074 Eng.
An economically priced U-Control model. Prefabbed parts include: formed balsa fuselage & wing, etc.

LITTLE ACE $1.95
SPAN: 18" For .049 to .099 Eng.
For team racing or sport flying. Kit is 100% complete with formed fuselage & wing, metal cowl, etc.

BEL AIR $2.95
SPAN: 18" For .039 to .099 Eng.
A control-line flyer that's loaded with flying thrills. Prefabbed model has all parts finished.

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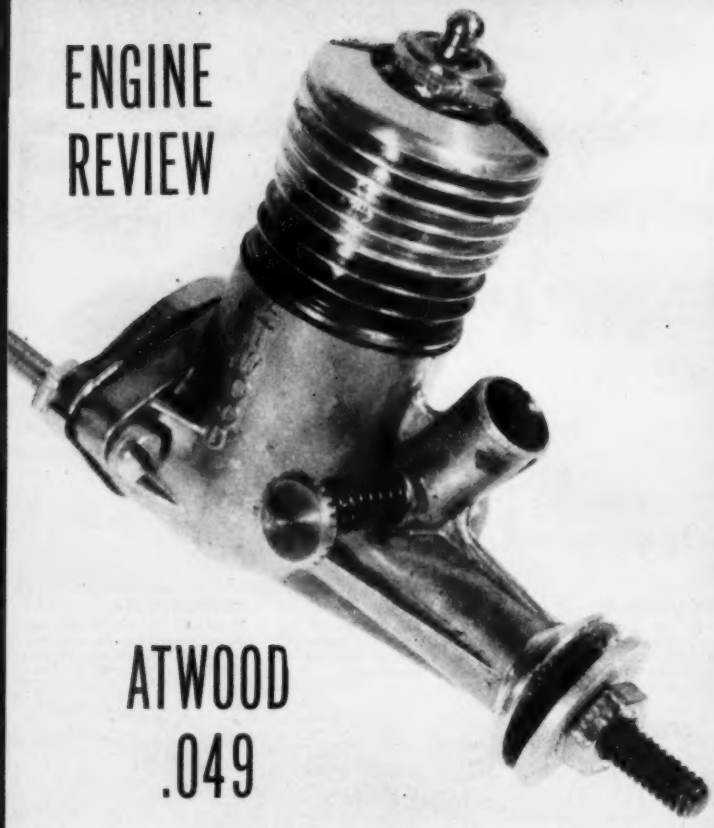
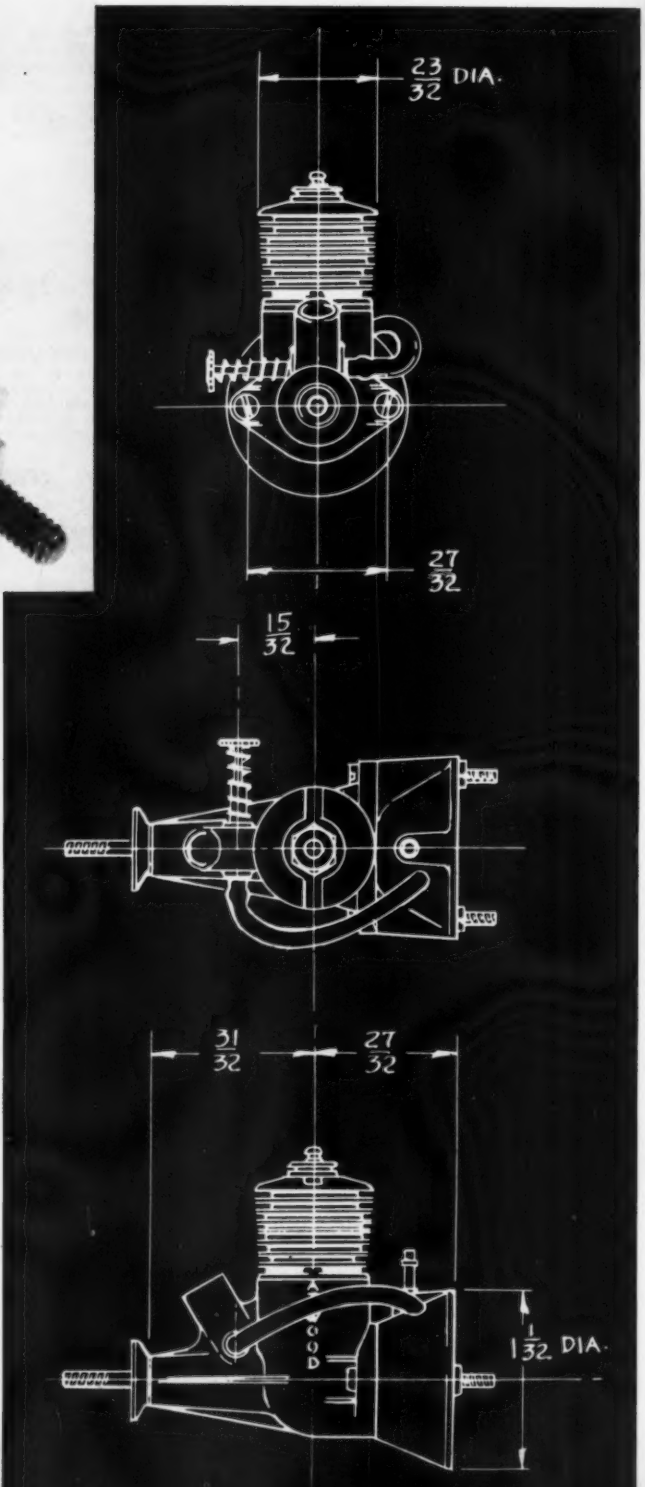
ENGINE REVIEW



ATWOOD .049

Re-engineered, this .049 and the .051 give a Class AA and A spread in same airplane. Short stroke, good volumetric efficiency combine for high revs.



by TED MARTIN

▸ The Atwood .049 and its longer-stroked companion, the .051, are light, compact engines with good volumetric efficiency and consequently, high peak rpm and reduced mechanical friction. This engine is one of the smallest and most compact engines of its displacement.

Crankcase is an aluminum alloy pressure die casting of such pleasing finish that the usual polishing operation has been omitted without detracting from appearance. Main bearing is unusually long and rugged and features a full length cast-in bushing. The two webbed radial mounting lugs are a full 1/8" thick and easily accessible. This mounting is neat, exceptionally strong and, when fitted directly against firewall, does not accentuate vibration troubles. An alternative tank mounting is available if required.

Main feature of the crankcase is provision of three large bypass passages instead of the usual two. The resulting increase in undisplaced crankcase volume is offset by reducing crankcase height and conrod length so that piston displaces a greater proportion of crankcase volume at B.D.C.

Charging pressure is therefore high, and fresh charge is able to flow very easily through large passages leading to bypass port belt, with result that engine breathes more easily at high rpm and gives more power.

The carburetor has a long raked intake which enters main bearing as close to crankcase as possible, consistent with adequate bearing compression seal. This enables use of a short, large (*Continued on page* 41)

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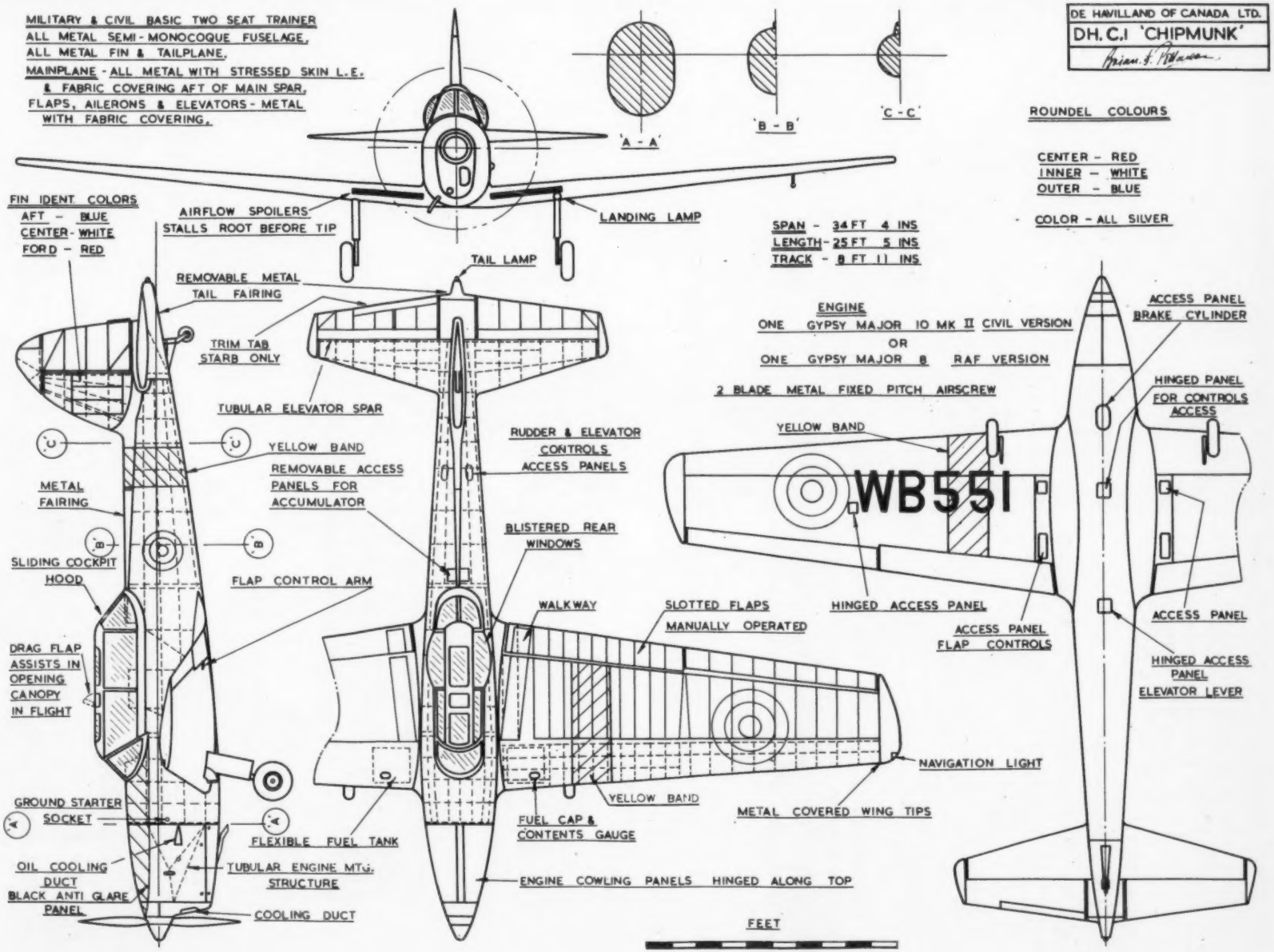
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STRUCTURE
ENGINE COWLING PANELS HINGED ALONG TOP
COOLING DUCT
FEET

MORE POWER

(Continued from page 23)

rpm is required in the air, and to select a prop which will allow the engine to turn the same rpm on the bench. A reliable tachometer is essential for this and a stroboscope is ideal. A resonant reed type can be used, providing it is known to be accurate. When later selecting a prop for use in the air, it is necessary, because rpm increases with forward air speed, to choose one which holds engine speed down by ten per cent on the bench.

Having arrived at the size of prop by trial and error, when using a particular racing fuel and the specified plug, one has the choice of experimenting with three different variables, individually or, best of all, a combination of three. These are different plugs, fuels and compression ratios.

However, since the weather on the day of the contest is likely to be different from that when you carry out these adjustments, it is obviously advisable to keep one adjustment, preferably a simple one, up your sleeve for quick tuning to the conditions prevailing at the time. Many people accordingly mix their fuel immediately before flying. However, this has many disadvantages, the main one being that it is obviously desirable to use the most powerful fuel available, and any alterations must reduce its ultimate potency, in spite of the fact that, as altered, it may give better results under the existing conditions. A far better and easier adjustment lies in simply changing to a hotter or colder glow plug, and adhering to the same fuel at all times. The next step, therefore, is to establish a fuel formula and stick to it as, together with the rpm, it will form the basis of further adjustment.

One can either select a good commercial racing fuel or brew up a special, and be confident that the proportions will not vary.

It is generally true to say that ball bearing engines will take a hotter fuel with a lower oil content than plain bearing engines and, while one particular fuel will usually give good results in any ball bearing racing engine, different plain bearing types will often require a certain amount of pampering because of variable frictional characteristics. However, most people use ball bearing types for extreme performance and more experimenting has been carried out as a result.

Since fuels are under constant development, one cannot offer a formula and say "this is it," but the most powerful and reliable brew known to, and guaranteed by, the writer for racing glow plug engines operating at 17,000 rpm and upwards consists of:—

40 per cent Nitromethane (Methyl Nitrate)
20-25 per cent Castor Oil (Bakers AA)
13 per cent Nitro Benzine (Oil of Merbine)
22-27 per cent Methanol (Methyl Alcohol)

In hot dry weather, it is advisable to use greater oil content and less methanol, as there is risk of seizure under very lean mixture conditions as tank empties, and for simplicity and safety, perhaps wisest at all times.

The working of this fuel is fairly straight forward. The oil is simply there for lubrication and is castor oil because it has the greatest "oiliness," and being organic, will mix with methanol. The methanol, although having a lower heat value than gasoline, requires less oxygen for combustion and will therefore produce more heat than gasoline from the same amount of oxygen, especially when employed at higher compression ratios. It will withstand without exploding or detonating. Compression pressure simply heats the mixture, and every fuel has a temperature limit above which it will explode when mixed with the correct proportion of oxygen. In engine parlance, this is usually referred to in terms of compression, as the "critical compression ratio" of the fuel, though it is often misleading as the possible maximum varies

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The NEW 1953 Atwood .049 WINS BOTH ½A EVENTS

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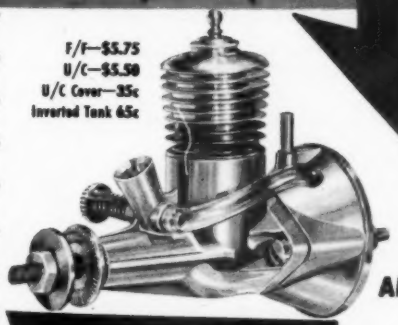

And Then WINS

1st—1/2A JR. PAA EVENT
Don Puskerich

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3rd, 6th, 7th, 8th, 9th, 10th in 1/2A FF OPEN EVENT

BAKERSFIED ANNUAL MODEL CONTEST—Bakersfield, Calif.
April 12th

No Wonder

—more and more top flight model builders who demand only the best engine money can buy are switching to Atwoods. They have tried them all.

AMERICAN LEGION CONTEST
Held April 7th at
SANTA ANA, CALIFORNIA
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(Site of the National Indoor Events)

Yes, modelers, the new Atwood .049 engines really "cleaned up" against all competition. This was the first big event of the season. It was a definite preview of things to come. Here is a partial list of ATWOOD-POWERED winners!

1st—1/2A OPEN SWEEPSTAKES
Toshi Matsuda—Time: 15' 29.2"

1st—1/2A JUNIOR EVENT
Wally Richards—Time: 16' 21"

4th—1/2A OPEN
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Join the "Big Switch"

—to this more powerful 1/2 A engine that's really hot and more adaptable. An engine with new, different, improved timing, larger crankshaft and by-pass area.

Watch for the new Atwood .15 International—same design as our .049. And don't forget our .051—all based on 20 years experience.

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A6M3	" 22	1115 H.P. " " 21	" " "	INCREASED RANGE
A6M3	" 32	" " " " "	SPAN 36' 2"	SQUAREWING TIPS
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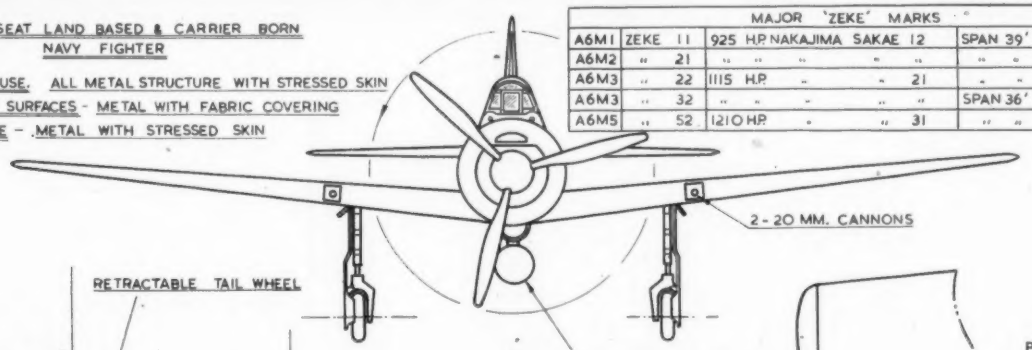
'ZEKE' TYPES

Basil Mann



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TOP SPEED - 358 M.P.H.

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OR DARK GREEN UPPER SURFACE & GREY UNDERNEATH
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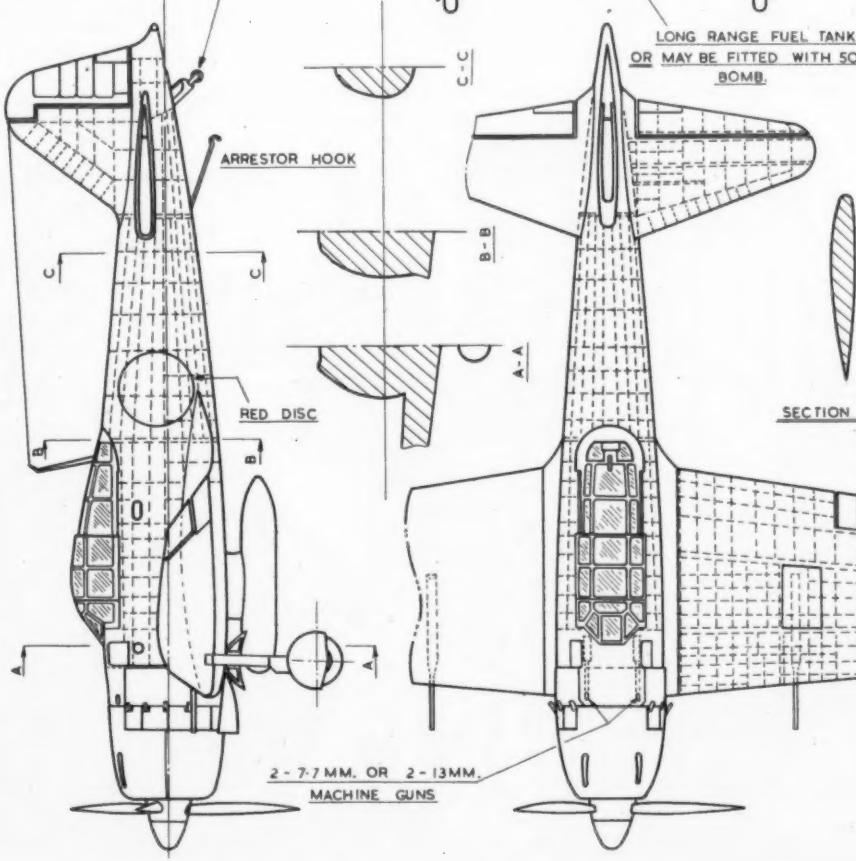
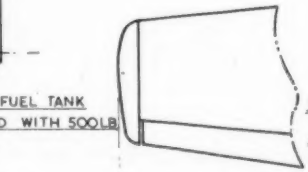
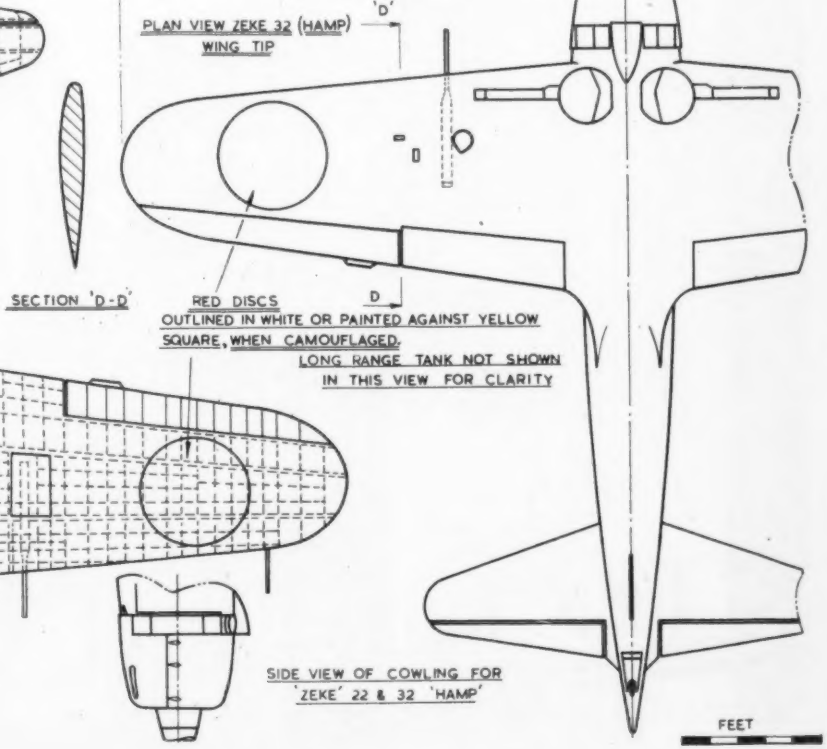




PLAN VIEW ZEKE 32 (HAMP) WING TIP



SECTION 'D-D'

RED DISCS OUTLINED IN WHITE OR PAINTED AGAINST YELLOW SQUARE, WHEN CAMOUFLAGED.

LONG RANGE TANK NOT SHOWN IN THIS VIEW FOR CLARITY

SIDE VIEW OF COWLING FOR 'ZEKE' 22 & 32 'HAMP'

FEET

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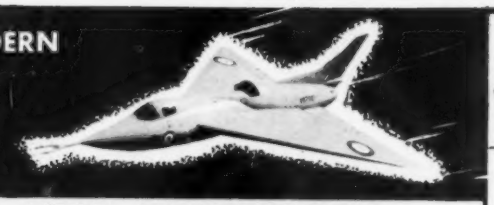

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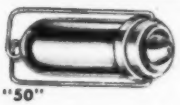
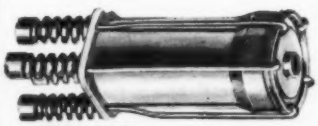


JETEX "50"

JETEX "150"



JETEX "350"

American Telasco, Ltd., Huntington, N. Y.

SPECIFICATIONS	jetex jet engines		
model	50	150	350
ENGINE WEIGHT	2 OZ	.75 OZ	2.5 OZ
FUEL WEIGHT (min)	2 OZ	.27 OZ	.4 OZ
TOTAL WEIGHT	4 OZ	1.00 OZ	2.9 OZ
① THRUST (max.)	.6 OZ	1.75 OZ	4.0 OZ
DURATION — one charge	12 SEC.	18 SEC.	12 SEC.
DURATION — two charges	—	—	24 SEC.
DURATION — three charges	—	—	36 SEC.
TORQUE	NONE	NONE	NONE
EXHAUST VELOCITY	1200 FS	1400 FS	1400 FS
OVERALL LENGTH	1 5/8"	3 1/2"	3 3/4"
MAXIMUM DIAMETER	11/16"	1"	1 3/8"
EFF. WINGSPAN	12-20"	18-36"	32-54"
② ENGINE PRICE	$1.95	$4.95	$8.95
③ FUEL PRICE	$ .65	$ .95	$1.00

NOTE 1 THRUST OF "150" WITH AUGMENTER TUBE: 2.25 OZ.
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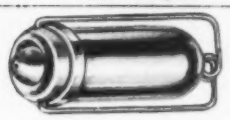

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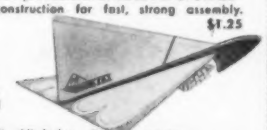

P-13 The first practical Delta Wing kit. All balsa, die-cut construction. An outstanding performer. 60c

*TM Reg.

appreciably when used in different engines. Another advantage of methanol is that it is highly volatile, and therefore cools the engine as it vaporizes by absorbing surrounding heat.

The factor which controls maximum power and rpm of an engine more than anything else is the ability of "breathing." For fuel to burn, it must have oxygen, and therefore, air. At high speeds, engine cannot get air fast enough and therefore cannot maintain power. A fuel which requires less oxygen to produce the same amount of heat as gasoline, will consequently give more power at high rpm. To carry this a stage further, we add a stable explosive, an explosive being a substance which produces its own oxygen to support combustion independently of an external supply. Nitro parafins have this property and, of the group, nitro methane is most suitable as it has a fair heat value and is most predictable in behavior. It suffers, however, from the disadvantage of having a low critical compression ratio. Since we want its oxygen supply and therefore wish to use as much of it as possible, as long as the extra oxygen is more useful than the greater heat value of some other ingredient, we have to add some other substance which will raise the overall critical compression ratio of the whole mixture without impairing any of its other qualities. Nitro benzine has a high critical compression ratio and reasonable heat value, also contributes its own oxygen, and therefore qualifies quite nicely.

The proportions given seem to be the best overall compromise and suit a compression ratio of about 8:1 and up to 10:1 in some engines. It is often possible to use high proportions of nitro methane without the addition of anti-knock nitro benzine, but it is not possible to employ such high compression ratios without it.

The question of best compression ratio is controversial. Its function is twofold. It primarily preheats the charge by compressing it immediately prior to ignition, which accelerates the rate of burning and therefore increases the gas pressure acting on the piston; it also serves to pack the charge into a small space where uniform ignition can take place.

Increasing the compression ratio is considered by many people to be an infallible means of souping an engine. Shaving the head is standard procedure, regardless, and the fact that high compression is the big gun in the current automotive horsepower race confirms this belief.

The actual effect of an increase in compression ratio and therefore an increased rate of burning, is that the charge is completely burned before the piston has travelled so far on the downstroke. The result is that maximum cylinder pressure is increased in proportion, with a consequently harder push on the piston. If no detonation occurs, maximum cylinder pressure is approximately ten times the maximum compression pressure, and varies accordingly. Providing that the engine is structurally designed to handle increased pressures and does not absorb the extra power in overcoming the friction induced by overloaded bearings and overheating, more power will be produced from the same amount of fuel, giving greater economy and more torque per cubic inch. However, we are more concerned with horsepower at high rpm than torque and economy, and the ideal compression ratio is often somewhat lower.

We are also concerned with small engines which have a very much slower piston speed than the full sized variety, but we do have the same flame rate. Consequently, our little charge is completely burned very early in the power stroke regardless of the compression ratio, so our maximum cylinder pressure is quite high anyway. As a result, benefits from high compression are not as apparent as, for

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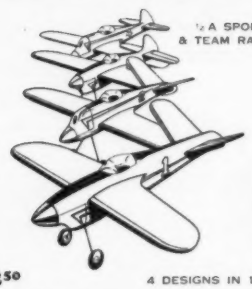

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instance, in a car engine, and the extra power required to compress the charge may therefore detract from delivered power.

This does not mean that the correct compression ratio is not important. It has a vital effect upon glow plug ignition timing by virtue of compression temperature, therefore it must be carefully adjusted to suit both fuel and plug.

The way to go about this is to make half a dozen head gaskets from soft brass, copper, or best, aluminum .002" shim stock, and using the chosen fuel and prop and recommended glow plug, run the engine and take careful rpm readings with one gasket, two gaskets, and so on, until the best arrangement is found. With the fuel formula suggested, this will usually be at a lower compression ratio than that of the stock engine, so there should be no necessity for machine work on the head.

That completes the tuning of a stock engine for maximum performance without resorting to structural alterations and refinements. Selection of the correct plug for prevailing conditions at the flying field and general handling considerations, will be discussed in a subsequent article.

Pusher Canard

(Continued from page 19)

The take-off procedure is accomplished by placing rear fin on the ground and using a single retractable strut placed near the front of fuselage.

Another suggested system is to use a small take-off dolly which remains on the ground (like Joe Weathers' old *Mystery Man* dolly). This eliminates landing gear completely and its weight. It allows a three-point suspension and use of less power (fewer strands and more winds) because model can run a few feet before becoming airborne. It is legal under the rules (attention Wakefield lawyers!).

The propeller is best carved left-handed. Actually, as far as flying is concerned, the direction of propeller rotation makes no difference but: try winding five ounces of live new rubber *backwards*. The rubber motor runs full length of the fuselage and can be wound from front plug. This allows winding without interference from propeller.

One thing that might profitably be investigated is the most efficient climbing angle. As with a tractor model, the more shallow the climbing angle the greater the power flight speed. However, the power climb angle seems more important in a pusher. A slight variation makes a large difference in altitude gained.

Interested modelers should try one of these designs for we believe they are equal to a tractor in performance and have two advantages: (1) ease of adjustment; (2) no propeller breakage—and, oh yes—more fun!

CONRAD CONNROD
GIMME THREE OF THOSE TWO-BIT PREFABS - I'M GONNA BUILD 'EM WHILE I'M TAKING CARE OF MY BROTHER'S KIDS -
THAT NIGHT
THESE THINGS ARE A SNAP, WHY I COULD BUILD THESE IN MY SL-
OK STEVIE - I'LL BE RIGHT THERE
YOU SWITCH THAT ONE, 'AN I'LL SWITCH THIS ONE - HURRY UPSTEVIE, 'CAUSE UNCLE CONNIE WILL BE RIGHT BACK -
WELL - THIS SURE LOOKS LIKE A CINCH
WHERE'S BULKHEAD "A"
THE NEXT DAY
PREFAB OR NO PREFAB - I'VE BEEN BUILDING FOR TEN YEARS, AND I'VE NEVER SEEN A MUSTANG WITH TRI WINGS AND A SCOOPER TAIL - I CAN READ PLANS AS WELL AS THE NEXT GUY AND ETC. ETC.

Engine Review

Continued from page 34

diameter gas passage in crankshaft with no increase in volume, and further improves breathing of engine.

Jet spraybar is pressed into position and has a pressure ring fuel line connection. It is threaded internally for the brass needle valve, which is provided with a coil spring friction device for maintaining settings.

The heat treated crankshaft has the familiar Atwood features with the same splined prop driver location, generous length, and heavily chamfered crank web. Rotary valve port, however, is much larger and is milled at an angle to produce a more efficient shape and facilitate breathing; the increased outside diameter of the shaft is relieved slightly from just ahead of the valve port to within an eighth of an inch of outer end to reduce oil drag of the inoperative portion of the bearing. Surface finish is produced by centerless grinding. Sufficient length extends beyond prop driver for fitting props up to 1/2" thickness.

Cylinder design is typically Atwood with three radial exhaust ports above three bypass ports which communicate with an annular groove in cylinder wall. Bore has a honed finish and is tapered from bypass groove downwards, to reduce viscosity drag. A vellumoid gasket seals the flanged joint where cylinder screws into crankcase; another gasket seals top lip of cylinder where it bottoms in the threaded dural cylinder head.

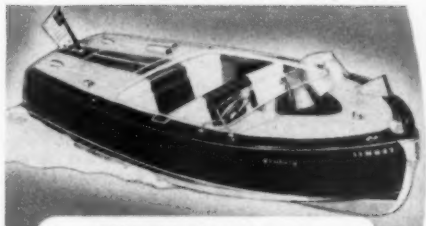
Piston is turned from steel, hardened, and ground to a very fine finish. A recessed boss receives spherical ended dural conrod, which is retained by an aluminum cup passed over "big end" and pressed over ball-end onto the boss. Crankpin bearing is a free fit, of average dimensions for engine displacement.

The new Atwood glow plug supplied with the engine is a relatively "hot" plug, which means that under normal running conditions it has a bright glow and permits successful use of a slightly lower compression ratio, which has certain advantages at high speed in a very short stroke engine. However, where some plugs will stand the use of two volts for starting without ill effects, this new plug will not; it is therefore necessary, if you favor the use of a storage battery for starting, to be quite sure that you have sufficient resistance in the leads to bring voltage down to 1.5.

With the spring friction needle valve, a little extra care is required during adjustment, as needle is inclined to move slightly under influence of the spring when fingers are removed. Also, care must be taken not to load needle sideways as, again, setting will change when you let go.

With free flight contest rules now encouraging use of smaller models in Class A, introduction of the Atwood .051 will be warmly welcomed by Half-A fans and, unlike other two-class engines where two different piston-cylinder units have to be stocked by the model shop for spares, the only difference between the .049 and .051 is a slightly longer throw on crankshaft. This difference is so small that, by changing shafts, port timing and compression ratio are not seriously affected, so if you have an eye to economy, the inference is obvious; if you want to get absolute peak performance from both setups, a little trial and error work with thicker head gaskets and thinner cylinder flange gaskets will give it to you—that is, if you fit a .051 shaft in an .049 engine (the other way round if you convert from .051 to .049).

Control line and free flight versions of both engines are available, former without tank, and latter with familiar tank mounting for extra 25 cents. The free flight may be converted for use with different tanks by



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SE 5	C-6	5.95
Ryan S-T	C-7	5.95
Ring Master	S-1	2.95
F-51 Mustang	S-2	2.95
Yak-9	S-3	2.95
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Chris-Craft 47' Buccaneer	B-3	7.95
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$1.00 EACH

KIT NO. M7—DOUGLAS SKYKNIGHT F3D-1—Wingspan 14¼"; Navy's twin-jet long-range carrier-based fighter; uses radar to locate targets.

KIT NO. M9—NO. AMERICAN MUSTANG F51—Wingspan 15⅛"; does a job where jets can't.

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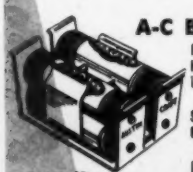

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AUSTIN CRAFT A-C

431 S. VICTORY BLVD
BURBANK, CALIF.

fitting a control line crankcase cover, costing 35 cents, and for inverted installations a special tank is available for 65 cents.

A 5-1/2 x 3 flexible plastic prop, and plated cylinder head wrench for protecting cylinder joints from overtightening when fitting plugs, are supplied with each engine.

TEST Atwood .049; Plug—Atwood, as fitted (1-1/2 volts to start). Fuel—O.&R.A.A. Running time prior to test—2-1/2 hours. Bore—.420"; Stroke—.360". Weight (with tank) 1-1/4 ozs.

Power Prop	R.P.M.	Top Flite	R.P.M.
6x5	10,500	6x5	10,000
6x4	11,900	6x4	11,100
6x3	14,000	6x3	12,600
5-1/4x5	12,500	Atwood Plastic (as	
5-1/4x4	14,100	supplied)	16,100
5-1/4x3	16,740		

This engine behaves well at all speeds and is particularly easy to start when warm. Performance is typical of Bill Atwood's Half-A engines, which all have very short stroke and high volumetric efficiency, in that output is quite modest until tachometer passes 12,000 mark. Then, it really starts motoring. It is wasting the abilities of this engine to use anything heavier than a 6x3 prop, and to get full advantage of new design features, 5x3 or smaller is necessary.

Man at Work

(Continued from page 8)

specs for a twin engine scale job Moynihan said he would build for MAN. D thinks everything should be fully stuntable—250 square inches on two .09's his idea. And, speaking of ships, he has a stunt job that combines team racer features with stunt design. Clean, real looking, and probably both fast and smooth. Gorgeous finish. There's another thing. These guys finish all their jobs, even first rc's, with spray and masking tape. See your reflection on the wings, almost. Like the Texas Eagles or California San Valleers with their beautifully finished free flights which are the marvel of every Nationals. Your model isn't any good unless it looks good, and this is all there is to it. Our own crude heaps must have looked doubly bad.

• • •

On the morning MAN at W shoved off, the 50-mile wind died down so, of course, D had to show us how well his Kitten .049 rc flew. This was at 9:30. At 4:30, 42 flights later, we put away all eight airplanes, two of them ours. D got off 30 times. Being on 465—we had 27—several simultaneous flights were made. Used four times fuel allotment we ordinarily dare use near New York. Milled around about a half-mile out, about 700 feet up. D had his original L.W. experimental job. Has logged over 2,000 flights; the Torp shaft wobbles like grandma's rocker but it still puts out. Around our area, most of the receivers are home-made from kits or mag articles—almost all on 27. Up there you don't make a dent unless you have three MacNabbs. Must have seen two dozen L.W.'s, all with 465. Lot of beep boxes, too, and you can't touch these for smooth flying and realistic approaches. The big L.W.'s also take off well. Accelerate well, swing left when tail comes up (torque does that) and you catch with right rudder. Ship lifts off, settles, bouncing slightly, and then skims along. Not smooth ground, either.

• • •

Penetrated the west as far as Erie, Pa., where Frank Schmidt is doing terrific things with multi-channel stuff, basically the same as Rockwood's, in that a three-tube receiver is used to operate reeds which in turn work servos to move controls. Frank's in television repair business but fortunately has a boy who takes care of the mundane details, leaving

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World War I
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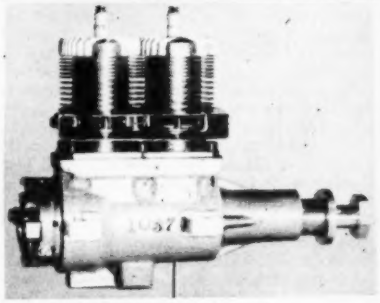

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AIR AGE INC. 551 FIFTH AVE. NEW YORK 17, N.Y.

Frank to really important stuff. This session lasted until 5 A.M. Tooling up, in fact, has many parts already made in quantity. Explanations of materials and methods, gadgets, etc. Has a largish wood building out back and, on this chill spring night, a big pot bellied stove poured out heat. Like a general store. During tests of reed banks, tested each other's hearing. MAN at Work is on the dog level—silencio! Probably will fail to hear the first dog whistle Jim Walker will blow at us after this one.

• • •

Arriving in Herkimer at 11:30 at night for a luncheon appointment, was given grand tour of the Cub engine factory by "young" Charlie Brebeck. Father and son have built an impressive business, with a new ultra modern plant that is now on its second million engines. That's a fact—pulled a work slip out of a box of cylinders and found that the code came out to 170,000 cylinders on one of the small engines alone. Herkimer even makes their own castings. The machine that does this takes two seconds to inject molten metal into the mold and turn out the set of castings—a set containing a certain number of cases, etc. Really fabulous to a model builder. Every engine is run. Would like to borrow the guy who started a million engines, first time we have trouble. Put a strobotac on a couple and they were breaking 13,000. Tried to get Charlie to put two .09's together for a .19. No dice. Maybe we should all get after him?

• • •

Free flight may have made a come-back but few manufacturers—Berkeley being a big exception that comes to mind—have done anything about it. This led K & B into kit field with a really sharp introductory number for Half-A, the Kiwi F-1. Later, a Kiwi F-2 and F-3 will be added, probably for bigger engines. It's a Lew Mahieu design. Lew created the Zeke, that madly climbing machine with the highly desirable tendency to keep its nose skyward, no matter what. This isn't a kit report, but emphasis is on contents, not the box. It's a long tailed design with rather low pylon which Lew put across so successfully in the old Zekes.

• • •

Speak of K & B and you speak of engines. Picked up a K & B 23, which gives a class B power plant interchangeable—same holes—with their hot .19. Flipped it on the bench and darn near dived under the table. They did something to this one, alrighty! . . . Also, McCoy .049 diesel. Ours is out being tested and can't wait to give it a try in the air. Meanwhile, keep hearing wonderful stories about it. Found McCoy's secret formula pencilled on the margin of the directions. Stuff has that necessary ingredient for a really good diesel fuel. Now we should do as well as the British with diesels.

• • •

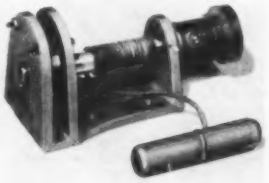
Last month, didn't have the chance to tell you about an interesting chat with Lou Andrews, whose Barnstormer is still a thriller. Lou had with him the new Beam, and no more thoughtfully developed, checked out rc, has ever been designed. From the ads, you can see it is a sport-type looking job with a trike gear for .09 power. Its construction and design are at least up to Guillow's standards on the Trixter series of ukie jobs. Up to, did we say? Let's give Lou and Guillow a bouquet on the Beam. It's a real flying machine. Have one of these abuilding, too.

• • •

Boat and car fans, grab a load of Herkimer's new flywheel for either their .099 or .14 engines. Has a convenient external knurl to ease starting, and a spin groove for a cord. Weighs 2-1/2 ounces, measures 1-1/4 inches . . . readers who need a high gloss paint for plastics, referred to Comet's new 15-cent bottles in 14 different colors . . . very nice booklet on the PAA-Load event, pix, text, 1953 rules, on glossy paper; write Educational Director,

New, Improved STARTER

without clutch, $1.95 **with clutch, $2.50**



It took us a little while to perfect it . . . but NOW it's better than ever. And we haven't broken a spring yet! Yes, here's enough power to start a diesel or a pressure job, yet it's easy to use and low in price. Batteries last longer. Can be set up on a bench, a tool kit, or any place you want.

Get a new Pylon Brand Starter to-day and get more fun out of flying.

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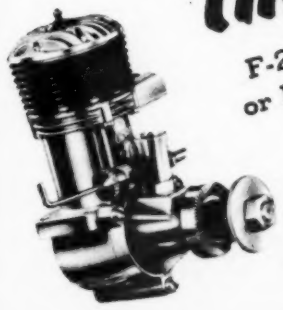

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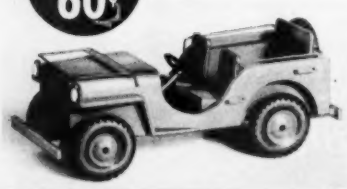

Pan American World Airways, 28-19 Bridge Plaza North, Long Island City 1, N. Y.... hear tell K & B .15 is a powerhouse, too. Fits FAI rules and offers Herkimer first competition in this category. Also ideal displacement for rc work. Their .09 also is on the way as this is written.

* * *

International Competition Handbook, sales of which will finance eliminations for both the FAI free flight gas competition and the Wakefield Cup, and for the sending of the team to England for the finals, is available for 35 cents at hobby shops. The 52-page handbook contains a number of excellent articles, plans, and features. The book is a buy, just for the info. If you would like to see the U. S. contend successfully in these international events, get a Handbook from your hobby dealer.

* * *

Rough sanding a blocked out nose the other morning, covered with balsa wood powder, when two blasts rocked the house, rattling windows and banging doors. By the time we reached the street, work still in hand, realized that some jet had dived through the speed of sound and that the explosions were but supersonic bangs. But it isn't safe to be a modeler. Neighbors wanted to know what we had been up to. Boom, boom.

* * *

Following is a lineup of eliminations: *Ft. Worth, Texas—Jimmy Stewart, 814 Oak St., Grand Prairie. *Detroit, Mich.—Art Jasion, 7523 Brentwood. Chicago, Ill.—Pete Vacco, Box 312EE, Greyslake. Galesburg, Ill.—Ken Freese, 224 Silver St. Omaha, Neb.—Ol Olsen, 6125 Maple St. Tulsa, Okla.—Willard Kehr, 4940 No. Jamestown. Wichita, Kansas—Bill Weaver, 611 Lightner Dr. Minneapolis, Minn. —Red Costlow, 1709 Logoon Ave. Boston, Mass.—Ed Dolby, 25 Exchange St., Rockland. New York, N. Y.—Bill Bletcher, 8708 Grand Ave., Elmhurst. Cleveland, Ohio—John W. Hillegas, 7804 St. Claire Ave.—Baltimore, Md. —Fred Verrier, 6115 Bellona Ave. *Hampton, Va.—Bill Poythress, 11 Dotson Dr.—Nashville, Tenn.—Carl Miller, 427 Deaderick St. Atlanta, Ga.—Fred G. Turner, 3284 Stillwood Dr., Hapeville. Miami, Fla.—Bob Quick, 1896 N.W. 36th St.

*Semi-finals also. For West Coast information, Dick Everett, 2133 So. San Antonio Ave., Pomona, Calif.

Daredevil

(Continued from page 12)

soft balsa 2" x 2" x 1-15/16" and hollow to 1/16" thickness wall with Exacto gouge. If you have an electric power tool, a rounded burr will also do a fast, neat job. Cut hole necessary in cowl to let it slide back over engine. Remove cowl and attach *Torpedo* gas tank to firewall with metal screw. Again make cutout in bottom of cowl to let it slide back to proper position over firewall. The cowl is attached by drilling through both cowl and clip with 1/16" drill, then inserting sheet metal screws. Carve two identical balsa cylinder cowls as shown and hollow to 1/8" thickness with gouge. Cement 1/8" bulsa nut plate to fuselage on both sides. Drill 1/8" hole through cowl for 3/32" I.D. tube bushings which are cemented in place to cowl. Now drill 3/32" through tube for locating center of nut and remove cowl. Drill 5/32" hole in these same 3/32" holes and force nut into hole, adding cement to retain it.

Cement two pieces of soft sheet balsa 3/16" x 3" x 16" together and let dry; then cut to outline as shown. Cut holes on both sides and sand frame. Notch tail at both tips and center to receive main spar 1/16" x 3/16" x 14" hard balsa. Cement ribs made of 1/16" x 3/16" balsa stock in place. Use 2/0 sandpaper block to round leading and trailing edges. Finish with #400 paper. Make 1/16" quarter-grain sheet rudder.

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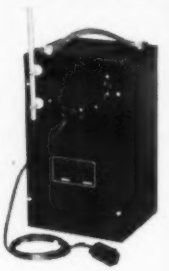
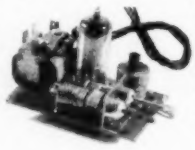


RECEIVER This is a HARD TUBE receiver tuned to 27.255Mc. It uses a type 154 tube with either 60 or 67½ volts on the plate and 1½ volts on the filaments. The plate current drain is about 2.2ma. or 2.7ma. depending upon the plate voltage used. The receiver can be mounted by the four corners or laid flat against the fire wall. Extremely rugged construction. Sizes 2⅞" x 1⅞" x 2½" high. Weight 4 oz. Receiver Type 27RH..List $19.95 (wired & tested)



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Make 20 wing ribs of 1/16" medium quarter-grain balsa. Notch trailing edges with file. Taper main spar at tips as shown. Pin spars down and cement ribs in place. Bend one piece of bamboo 1/16" thick by 1/4" or 3/8" wide over candle flame. Split to 3/32" thickness for two identical tips. Notch leading and trailing edges and cement tips in place. Add ribs R2 and R1. Remove lower 1/4" of main spar at center to allow for plywood sandwich. Cement bottom piece of 1/16" plywood on top. Cement 3/8" sheet soft balsa fillers as shown on top. Carve airfoil to fit inner rib and round the leading edge. Sand with 2/0 paper on block followed by #400 paper. Bevel ends of wings to fit fuselage when placed on tongue.

Brush one coat of clear STA on fuselage. Sand with #400 paper. Cover fuselage with small panels of white Jap tissue, using clear STA for adhesive. Brush on three coats of Testors sealer, sanding between coats with #400 paper. Fuselage is painted with three coats of red STA, some thinner added. Cover rudder as done on fuselage. Cover tail surface with tissue and clear STA for adhesive. Dope down edges after trimming. Shrink tissue with water. Dyed clear STA dope was used on original.

Here is a weight saving trick used by contest fliers. About five teaspoons of aniline yellow dye is placed in a four-ounce bottle of STA thinner and shaken. Pour the dyed thinner into dope. Do not pour all dope as bottom portion will make a freckled paint job. A sprayed dye job is something that sparkles and stands out over other contest fliers. Three coats brushed on will do a good job. Warp 1/4" wash-in on left wing only. Dope tail surface.

Cement rudder on fuselage with one degree right. The rudder should be in same line as motor thrust. Carve soft balsa fillers to fair in fuselage along rudder out of 1/4" soft sheet balsa. Paint red. Hinge line of tail and ailerons are represented by 1/16" stripes of black Trim Film decal. A two-inch racing number decal is on each side of fuselage. This same number is located on upper left wingtip and lower right tip. It is 3-1/2" high. License number is 3-1/2" high, NIIC decals, and on upper right and lower left wings. Slide wings on tongue and hold in place with rubber band around fuselage bottom. Attach tail surfaces with rubber. To keep tail keyed in place, cement four 1/16" sq. x 3/16" soft balsa cleats under tail next to platform. Attach center and cylinder cowls, prop, spinner. Last, carve balsa pilot and cut plastic canopy from five-inch bubble canopy. Cement in place. Add 1/16" white paper strips as shown. Total weight, 11 oz. Area, 192 sq.

Model should balance two inches back of leading edge. Wings can be slid fore and aft for field adjustment. If ship is still nose or tail heavy, add clay to balance. Hand glide before flying. Model glides and flies in left circles. Do not attempt full power until plane is adjusted properly.

Pusher

(Continued from page 26)

on bottom at center and raise one wingtip 1-1/2". Cement center joint and let wing dry.

The motor stick or fuselage is made from a 15" length of 1/8" x 1/4" balsa. Choose medium weight balsa for this piece as it must withstand twist and bending of fully wound rubber motor. Fasten thrust bearing and hook in place as shown; then wrap with very fine silk thread.

The stabilizer is constructed of 1/16" square spars and 1/16" square ribs previously cut around wing rib template. Cut excess length off rear of ribs and allow stabilizer unit to dry completely before breaking at center joint and bending one tip upward 2" for necessary dihedral.

The propeller shown is of very simple three-piece construction, perhaps not as efficient as a carefully carved and sanded propeller, but certainly much easier for a beginner to construct. The blades are cut to shape shown in pattern from 1/32" balsa and hub is notched as shown to receive blades. Add wire hook and washers, and propeller is ready to assemble to thrust bearing on motor stick.

Cover wing and stabilizer with tissue, using separate pieces for each half and cementing them in place with thin clear dope. Cement stabilizer in place on top of 1/8" sq. incidence block and attach two wire wing clips to wing. When dry, clip wing in place, add a loop of rubber and pusher is ready to go. Turn can be controlled by warping elevator leading edges up or down. A little practice will quickly show how it's done.

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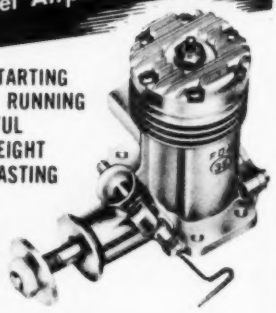

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New Stunt Rules

(Continued from page 15)

of the overhead eight, raised from 30 to 45 degrees. This limit gives a flier using 60-foot lines 47 feet in which to execute climbs, dives, and loops and the flier using 70-foot lines 55 feet in which to maneuver. Forty-five degrees being halfway point was also considered as easiest angle to judge. If you can do vertical eights, you are already capable of flying well within the new limits.

A new level flight altitude has been established. It is called "normal level flight" and has been "designated as level flight at approximately shoulder height, but not under four (4) feet." If you normally fly at the six-foot level of the six to ten feet previously allowed and are under five feet tall, it will be necessary to fly approximately two feet lower to get full points.

Emphasis is still placed on precision and smooth flying and not on how tight you can fly. The flier who can fly a smooth, precise pattern, but exceeds the new limit, will receive more points than the contestant who flies a rough or irregular pattern within limits of maneuver. Penalty is only two points each time limit is exceeded. Maximum points will only go to the flier who can perform a precise pattern within the limits.

Flight pattern has been smoothed out, eliminating unnecessary ups, downs, and reversals of direction. On completion of climb, a contestant is required to fly three laps at his recovery altitude, correcting it if necessary before making his dive, eliminating any additional dives or climbs when recovering or going into maneuvers. Inverted flight has been inserted between inside and outside loops in such a manner that flier, on completing his last inside loop, will continue another half loop, recovering inverted and coming down to normal flight level, where after two laps he is judged for "normal inverted flight". On completion of inverted flight he continues at least one more lap, does his outside loops, starting from inverted position and recovers in level flight.

"Reverse wing-overs" were selected as an additional maneuver, to demonstrate fliers ability to make high speed inverted turns where no rhythmic sequence exists. The "square cornered horizontal eight" was chosen to show contestant's ability to accomplish an inverted or outside square cornered maneuver with a reversal of direction. Other maneuvers submitted were rejected as demonstrating abilities already adequately proven in existing pattern or were of such a nature as to make accurate judging impractical.

The radical change in the rules is scoring. How to establish a workable point breakdown greater than the existing pattern presented a major problem in rules revisions. Judges who can look at the whole maneuver and do a consistent job of assigning scores without a guide are extremely rare. In most cases they have a tendency to adopt the style (rather than a conformance to rules) of the most prominent flier in their area as a criterion for judging all flights. Establishing scores for numerous possible variations of a maneuver would not only have presented a problem of agreement on point value of each variation, but training judges for this type of rule would be nearly impossible.

Scoring system developed is based on detecting errors or deviations from the correct flight path in various parts of the maneuver rather than errors in the whole maneuver as in the past. Flying points are revised so maximum score possible in a maneuver is determined by number of possible parts or places in which errors can be readily detected. Twenty per cent of the total score is allowed for accomplishment of maneuvers regardless of degree of perfection. On consecutive maneuvers the first two or three turns establish

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a rhythm, reducing value of accomplishing the rest. Therefore, the number of consecutive maneuvers are reduced, although total flight pattern score has been retained at 315 points. Physical scoring of the pattern has been simplified to a point where a judge could score or mark entire flight with a hand counter if scores for individual maneuvers were not desired. A constant two points is scored against any part of a maneuver with an error. Judge can concentrate his entire attention on flight of the model and is not required to remember any point values or make a decision to how many points maneuver is worth.

In learning to judge under new scoring system, emphasis should be placed on learning limits and appearance of the *correct maneuver* using "Error" scoring to familiarize yourself with, and to *detect deviations* from correct pattern as they occur. Place concentration on pattern as it should be done and variations from this will be readily noticed. If you concentrate on looking for all possible errors only, half of the flight will be observed. It would be a super human task to look for and independantly judge each part at speeds they occur in more advanced maneuvers.

Using consecutive inside loops as an example—correct loops are judged when model starts from normal level flight and makes a series of three smooth, round loops, all done in same place with line(s) at no time exceeding an angle of 45 degrees with the ground. Model then continues for another half loop, recovering inverted and descending to normal flight level, flying two laps before being judged for normal inverted flight.

Maximum 20 points; Minimum four.

Errors are: *First Loop:* Loop is rough or irregular—two. Lines go above 45 degrees—two. *Second Loop:* Loop is not in same place as previous loop—two. Loop is rough or irregular—two. Lines go above 45 degrees—two. *Third Loop:* Scored same as second loop. (Examples—A flier who goes too high on first loop and corrects on second will lose four points (two on first, two on second) because of loss of consistency points on second loop.)

If contestant makes his first loop round and smooth but goes above 45 dgrees you count *one*. On second loop, he loops in the same place, still goes above 45 degrees, and has to turn abruptly at top to avoid drifting so you count *two* and *three*. On third loop, he makes a perfect loop within limits but, since this loop is not same size as previous one, he loses consistency and you count *four*. Flier makes a correct recovery so you enter *four* after the maneuver and get set for next maneuver. After pattern is finished, multiply your count of four by two and subtract it from the 20 possible points, giving a score of 12 for Consecutive Inside Loops.

There are only a few basic errors which are repetitive in consecutive parts of maneuvers, so don't let the apparently large number of possible errors in the eights throw you.

STUNT THAT R.C.

(Continued from page 25)

power by prop changes, needle valve adjustment, and other methods mentioned. This is as important as a good airplane and sometimes an extra control.

Probably the most common of advanced radio control stunts is the "loop." Also, it is one of the most difficult to perform with any degree of prediction in advance. Most R.C. planes lack power to pull completely through a loop and, as a result, the loop turns into an Immelman or a wing-over as plane stalls out at top. Here, it is more important to obtain all possible power from the engine; therefore use a small diameter low pitch prop that will develop high engine rpm. This can be the difference between success or failure

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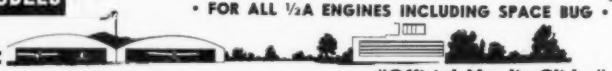

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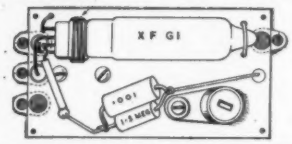

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in this stunt. The writer's present ship, the "CQ" (June 1952 M.A.N.) is a 60" span ship weighing 56 oz. with all equipment installed. It is powered with a *Torp* 19 at present which develops adequate power for all stunts. This ship, with an 11" diameter, four-inch pitch prop, will not do a complete loop, but by switching to a nine-inch diameter,, 4- to 5-inch pitch prop, up to five successive loops have been done on many occasions. The loops that add up points when the chips are down must be clean, straight and over the top without stall and, in the case of multiple loops, approximately the same size diameter.

To accomplish this maneuver, some method must be used to gain speed or momentum to cause ship to nose up when coming into wind. The best method is to start the stunt with a spiral dive of from one to three turns to right or left, whichever direction causes tightest nose down turn. Number of turns in the dive is determined by amount of speed required to raise nose upon neutralizing and to carry ship on over the top. If nose will not drop fast enough in the spiral, shift batteries forward or increase amount of rudder deflection or both as required.

A hint might be added here which will aid gain in speed for the heavier, larger, more stable airplane. To put such a plane into a sharp spiral dive, first do a one turn dive and neutralize to put plane into a stall. At top of stall, blip left rudder, then hold right rudder and ship will wing-over into a tight nose down dive. This will take a little practice and perfect timing, but is the only means that can be used to build up speed in some airplanes. Don't forget the extra stress that will result on pull out with a heavy plane or you will be a customer for a new one at your local model shop.

Control should be neutralized approximately 30 degrees before coming into the wind. If recovery is slow, a momentary blip of opposite rudder will snap ship out of turn and into resulting climb following pull out. If ship starts to fall off on either side, a quick blip of corrective rudder will straighten it out. Care must be used in correction because at high momentum, rudder effect is very strong. Some ships may require a slight addition of positive incidence to the wing or negative incidence to stabilizer to start nose up quicker after recovery from dive. The three most important factors to successful loops are high engine rpm, a tight nose down dive to build up speed, and recovery directly into the wind. An interesting version of a loop is the "quotation mark" loop which is the result of a complete inverted stall at the very top which results in a "snap completion." A low center of gravity and very small stabilizer usually contribute to this result. Loose rubber holding the wing down will also result in this type of loop. Long hours of practice are required to perfect it, particularly when stunt has to be called in advance.

We might digress here for a moment on this requirement of calling a stunt before it is done. A.M.A. rules call for a flight plan listing stunts prior to each flight and, in fairness to all contestants, judges should insist at least on the call of each stunt at least five seconds in advance of the stunt during a flight to prove that pilot has actual control and can predict maneuver in advance. Almost all ships stunt at sometime or other, but the true test of a pilot's skill is to do the stunt after it is called.

The next stunt is the "Immelman." This maneuver was developed as a means of gaining altitude and at the same time to reverse direction of flight during the days of World War I. Another method to gain this end is the "Chandelle," but more on this later.

The "Immelman" is a half loop from bot-

(Continued on page 50)

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tom to top with a half roll on top to go from inverted to upright position. This results in the gain in altitude and change in direction described above. Stunt is started same as a loop with the usual spiral dive to gain speed, neutralization of rudder to straighten out with following nose-up start of a loop. The trick is to stall out at top of loop and to make ship roll at the moment of stall. To bring this about, lessen the number of turns in the dive from amount required for a loop. Usually only one turn is required for the Immelman. Recovery from dive must be made in a down-wind direction in order for ship to be slowed at top of loop as it comes into the wind. If speed is too great, do only half turn dive before starting loop; if speed is not great enough to carry ship up to top, increase number of turns going into the loop a half a turn at a time. Experimenting will develop skill in judging the right speed to start loop. To cause the roll at top, simply touch right or left rudder momentarily and ship will roll out to an upright position. Here again engine speed plays an important part and it may be necessary to slow rpm some to prevent a complete loop while attempting an Immelman. A slight wind will greatly aid stall-out at top, and this stunt should be saved until wind rises enough to help. Wind can be a great aid in many stunts and an enemy to others; therefore, stunts should be planned to fit average flying conditions expected during the day.

The next stunts in order are the wing-over and the split "S." These two stunts are started with the same basic preliminary moves to throw plane in position for the final stunt itself. The difference is the number of oscillations to produce the final end effect of the wing-over or the split "S." Both are the most simple to do and the split "S" is sometimes done unintentionally at too low an altitude with disastrous results such as running out of altitude before recovery.

The "wing-over" is best described in step form with first step a long climb, second step, an approximate 180 degree turn. The best method to start the maneuver is to gain speed by the usual one or two turn spiral dive. As plane balloons up in a climb, rudder is applied near top and model stalls in the turn, noses down in a dive and then proceeds into a second stall. At the top of this stall, opposite rudder is again applied and process repeats. This is continued until the 180 degree change of direction occurs, which is the stunt desired—the "wing-over." A fast model will usually do this stunt on the first change of direction which adds much to the desired effect. The larger, slower ships may require four or five oscillations before desired change in direction occurs.

The "split S" can best be described as a long climbing half roll to an inverted position with recovery to normal flight position, a half loop. This stunt is very spectacular and always is a crowd pleaser. With a little practice, it can be done with ease, but care must be taken to not start at too low an altitude as considerable sky can be used up before normal flight altitude is regained. Another thing to guard against is a second and third unintentional split "S" as a result of momentum gained from the first, in the half loop dive at the end. The best recovery to use to avoid this unpleasant ending is to apply a very short blip of rudder to start plane in a spiral climb which will soak up momentum gained in dive. The split "S" can also be accomplished by gaining an excess of speed from three to five turns in a spiral dive and quick application of rudder just at the point of recovery as plane starts its upward climb. Do not hold rudder or a complete roll might result if speed is great enough.

This is the tip off to doing the barrel roll, the last stunt to be described in this series. It is suggested that this stunt not be attempted until experience and practice is gained with those listed above and knowledge is gained on how to recover from bad attitudes at low altitude. It is done at high forward speeds as rudder effect is always greater as speed increases. To enter into the barrel roll, which is a complete roll about the fore and aft axis either to right or left, several turns in a spiral dive are necessary to gain all possible speed. The low pitch, small diameter prop will aid here as well as in the loop. After all possible speed has been gained, rudder is neutralized; as recovery reaches the point at the start of the climb, a quick blip of rudder is given for either left or right turn followed immediately by opposite rudder which is held until roll is completed.

(Continued on page 52)

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ADVT. INDEX, JULY 1953

A-J Aircraft Co. 1
Ace Products 44
Allyn Sales Co., Inc. 47
American Telasco, Ltd. 39
America's Hobby Center, Inc. 6, 7, 9
Atwood Motors 37
Austin Craft 42
Berkeley Models, Inc. 54, 55, 56
Carter Craft Models 42
Cheminol Corp. 5
Cleveland Model & Supply Co. 39
Comet Model Hobbycraft, Inc. 42
L. M. Cox Manufacturing Co., Inc. ..... 3rd Cover
Crafts and Hobbies 40
Thomas Y. Crowell Co. 45
Dad's Hobbies Unlimited 40
Dealer Directory 50
DeBolt Model Engineering Co. 50
Dyna-Model Products Co. 52
Electronic Specialty Supply Co. 44
Forster Brothers 43
Fox Manufacturing Co., Inc. 46
Francisco Laboratories 46
G & M Products 47
Great Lakes Battery Co. 45
Guillow, Paul K. ..... 2nd Cover
Gull Model Airplane Co. 40
Herkimer Tool & Model Works, Inc. 3, 53
Hobby Enterprises 44
Holland Engineering Co. 8
Junior Aeronautical Supply Co. 48
Kenhi Model Products 46
McCoy Products Company ..... 4th Cover
Mod-Ad Agency, The 6
Monogram Models, Inc. 10
National Model Distributors 37
North American Model Products Inc. 47
Ohlsson Manufacturing Co. 49
Olson & Clark Mfg. Co. 40
PAL Engineering Ltd. 42
Pactra Chemical Co. 51
Precision Control Labs. 52
Radiomodels 48
Russell Brothers 48
Scientific Model Airplane Co. 33
Sterling Models 41
Sullivan Products 43
Testor Chemical Co. 28, 29
Top Flite Models, Inc. 44
Western Model Distributors 41

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This momentum of the ship going from one turn to the other causes ship to do a complete roll at this high speed. If ship will not roll after following above steps, addition of rudder area or increasing rudder deflection will bring about desired results. The twin rudder tail set up really works fine for this stunt. Wing stresses are very high and it was our sad experience to lose a wing panel while attempting this stunt which was followed by a 500 foot dive to a concrete runway. After this crash, remains were pocket size, a really complete washout, the only one ever suffered in R.C. flying. The accident happened after completing over 90 flights, further proving the extreme stress of this maneuver. This wing failure occurred while attempting a roll, cross wind, in about a 20-mile an hour wind. A roll into the wind or downwind would probably result in lighter stress on the wing.

A word of caution regarding radio equipment in stunt type models. The "G" forces developed in some of these stunts sometimes are very high; therefore, extra precautions must be taken to prevent batteries from coming adrift. The radio itself, if supported by rubber bands, should have extra strands added. The author's ship has at times suffered a bent tank coil on the bottom of the receiver even though there is three-inch clearance between coil and batteries. Wing "tie down" rubbers should be double strength and wing covering of tissue or light paper is not adequate if ship is on heavy side as to wing loading. Never try stunts at low altitude as misjudgment will result in a demolished plane. Reliable radio and escapement operation are a "must" to stunt flying. A "beep box" such as the type developed and described in the June 1951 M.A.N. is also a great aid in selecting the right control.

The writer has also developed a form of elevator boost which is now incorporated in the present "CQ." This extra control is still operated with the conventional single channel receiver. The elevator is a six-inch long, one-inch wide strip secured to stabilizer in conventional elevator position at trailing edge. This extra surface is operated by the same escapement that operates rudder; the elevator linkage take-off being located across the fuselage instead of vertically as for rudder. This arrangement with the conventional two-arm escapement gives the following control positions: right rudder, down elevator, left rudder, up elevator and again to right rudder. This means that up and down elevator positions occur at the usual neutrals and that some form of control is always in effect.

This is not as bad as it sounds when you consider the elevator as a means of up or down trim instead of the usual full elevator with its full up and down effect. The ship is trimmed for most of its flying in down elevator position which can be adjusted to result in straight flight or flight in a slight climbing altitude, depending on what type of flying is being done. By using an exceptional amount of down elevator with a forward shift of batteries, sustained dives can be done. In this condition, up elevator becomes the position for normal flight. This elevator control was developed primarily as an aid to stunting. By using down elevator, greater speed can be built up for the start of stunts without the spiral dive required when elevator is not used. The up elevator position permits much tighter loops and also successive loops which will bring 30 points under A.M.A. rules for three successive loops. The use of elevator as a trim measure during landings is an invaluable aid for final corrections. Elevator control also permits straight flight directly into the wind which greatly reduces effect of drift by allowing high speed straight flight without the constant fight to keep from going too high.

The Remarkable Wrangler

(Continued from page 16)

made in the fourth model, the motor was again being inverted. This model was two mph slower and did two laps less to the tank than its predecessor, but was an improvement from the operational standpoint.

Unfortunately, *Wrangler IV* was wrecked, motor included, in a pile-up at a London meeting in mid '52. Its replacement, *Wrangler V*, is of identical design and is currently flown on another Eta .29 (not one of the current Series III models as now sold, which are faster and more powerful, but a Series I type which has been reworked slightly). This ship clocks a genuine 100 mph, but laps are down to 33—that is, needing four refuelling stops in a 10-mile race, as against three stops when over 40 laps per tank are achieved —and Wright feels that more laps and slightly less speed would be better. This should not be too difficult to achieve.

Pete Wright sums up his aim as being a 90-100 mph model, able to better 2-1/2 miles per tank (the *Wranglers* have shown themselves capable of this), not too complicated and strong enough, barring collisions, etc., to last through a whole season's flying.

Our plans show the latest Mark V version of *Wrangler* with all modifications and improvements shown desirable by previous models. The Dooling .29 is shown installed. The only alterations needed for installing the McCoy .29 or Eta .29 are slightly different spacings for mounting bolts.

British team racing rules are basically the same as, in fact, are based on those of the United States. There are just one or two additional requirements, but the only one affecting the *Wrangler* which readers may care to modify for sake of appearance, is the use of two-inch wheels. Actually, these large wheels are effective, combined with extreme forward rake of landing gear struts and very low ground angle, in smoothing out landings and preventing nose-overs.

The only essential changes are to fly on A.M.A. 60 ft. lines (14 laps per mile) instead of S.M.A.E. 52-1/2 ft. (16 laps per mile) and the addition of an engine cut-out, a feature which is not currently demanded by British team racing rules. A D-E or K. & B. fuel cut-off valve can be easily installed on firewall—either on the engine or tank side—and linked to bellcrank or pushrod in the usual way.

It will be noted that there are no offsets or line rake. The only concession to assisting line tension in this respect is the slightly assymmetric section of the rudder, all trail-

(Continued on page 54)

(15) Fifteen Famous Fighters (15)

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Jam-packed with metal castings, every little detail visible in the actual airplane — every single item that can be reproduced — is given to you.

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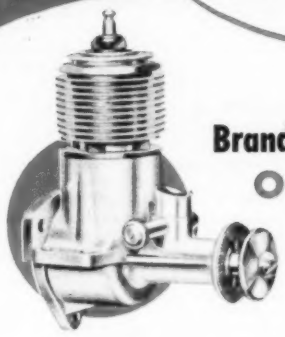

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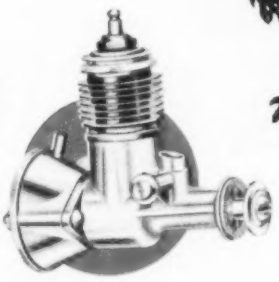
OK CUB .14

Requested by leading plane designers. Light — only 2¾ oz. Souped-up power — 3,000 to 15,000 RPM. For free flight, U-control and R/C flying. **$8.95**



Top Performer in ½A Class!

OK CUB .049X

Combination Package

Companion to the famous .049 Cub. Shorter stroke and larger bore deliver higher output. Package includes assembled engine, matched prop, extra rear cover, fuel tank, neoprene tubing. **$6.25** Complete

Complete Power Plants at Low, Low Prices!

OK CUB Combination Packages

Get an OK Cub Combination Package in any of 4 displacements and enjoy the best in value, power and performance. Each package contains assembled engine, prop and fuel tank.

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OK .049 Power Kit

A $6.15 value — assemble it yourself and save $1.20!

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Outstanding ½-A

Beginner's choice — rugged — easy to start.

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Unmatched for stunt and speed flying.

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Sensational for powerful performance in Class A.

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Quicker Starting, Faster Accelerating!

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Long-lasting platinum glow element assures easy starting, higher speeds. ¼-32 longs and shorts for all engines. **59c**

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Including:
TRANSMITTER, ANTENNA, RECEIVER, ESCAPEMENT, & O-E MILLIAMMETER

Yes, you can now save over $7.00 on this combination deal. Nothing else to buy except batteries . . .

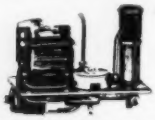
"Super Aerotrol" 27mc. Crystal Controlled
TRANSMITTER
—Operate and Maintain Yourself!

Portable — Self contained — No separate antenna — No external Batteries! 3.5 lbs.

ASSEMBLED UNIT $27.95
With tube — less batteries

IN KIT FORM: $19.95

Kit includes all necessary parts (except tube and batteries): Precision Ground Crystal; Painted Metal Cabinet; Finished Sectional Antenna; stamped and formed chassis with all holes punched; all necessary components, resistors, condensers, coils and chokes; color coded wiring. Can be assembled in less than two hours. Complete building and operating instructions are included.



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Dust Core Tuned
RECEIVER

Super-regenerator circuit, 100% dependable.
• NEW "locked-channel" dust-core tuning.
• Light in Weight, 2¾ oz. less batteries.

ASSEMBLED UNIT With tube — less batteries $21.95

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Kit includes: Finished, tested sensitive relay; finished dust-core tuner; drilled bakelite base with condensers and eyelets attached; all electrical components, condensers, resistors, coils, chokes and potentiometer; all necessary contacts, and color-coded wiring. Can be assembled in less than two hours. Complete building and operating instructions are included.

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Assembled only $3.95

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D-E AEROTROL (52mc.) Kit ... $22.95
Includes Transmitter, Receiver, Escapement (less batteries and tubes)

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ing-edge taper being on lefthand side in order to provide a very slight outward ruddering effect. Rigging and thrust angles are zero to center line, with exception of wing, which has one degree positive incidence.

The prop size favored for best speed and distance combination for a 10-mile race is a square-tipped eight-inch diameter, nine-inch pitch. Fuel normally used by Pete Wright is 60 percent methanol, 20 percent nitromethane and 20 percent castor base lubricant. The tank follows speed model proportions, being tall, long and narrow. Nominal capacity is one fluid ounce, or 1.8 cu. in. This is increased slightly by the "last drop" bulge, from which feed pipe draws, and is lessened by the volume displaced by the pipe itself. Therefore check capacity of your tank against a fluid ounce measure before soldering up last seam. Note that filler and vent pipes face forward.

The *Wrangler* is not perhaps a particularly pretty looking ship but, to us, its lines are businesslike and not unattractive in the functional manner. The model is easy to build and, although it weighs only 20 oz., is rugged enough to stand up to the usual rigors and excitement of a team race.

Construction differs from normal practice in that assembly is commenced with the wing. This is because wing and fuselage are interlocked into a single unit and basic fuselage structure is assembled around the wing.

Start by butt jointing different grade sheets together for top and bottom skin. Note that bottom skin follows complete outline of the wing, including tips, whereas top finishes at tip rib W.5, a soft block being added to round off tip section. Cement hardwood spar to bottom sheeting and fit bellcrank with forward end of pushrod and lead-out wires. Then add ribs and intermediate spars.

Make fuselage formers, F.1, F.2, and F.3 and shape hardwood engine bearers. Drill and shape bearers to suit power unit chosen. Bend landing gear and bind and cement to plywood firewall F.2. Now fit F.1, F.2 and F.3 on bearers, cement strongly in position, and bolt engine in place to aid alignment. While this sub-assembly is hardening, add top skin to wing, first cutting out a rectangular opening to clear bellcrank as shown.

Make up fuel tank, with filler, vent and feed pipes; check capacity and test for leaks before fitting, Secure tank to engine bearers with small woodscrews. Also fit fuel cut-off valve at this stage, if desired for contest work. Now cut out two 3/32" medium-hard fuselage side panels. Cut slots to shape of wing section accurately to preserve correct incidence.

Lightly sand wing to remove any roughness, then begin assembly of main components by sliding fuselage former F.3 through slot provided in wing, at the same time feeding front end of pushrod through hole provided in F.3. Slide fuselage panels formers, motor-bearers and wing. Shape soft balsa tailblock and cement rear ends along each wing panel and cement firmly to of fuselage to it.

Cut tail unit parts and sand to section. Make up elevator horn assembly and add hinges. Cut and fit remaining fuselage formers and cement stabilizer onto fuselage, threading rear end of pushrod through last three formers. Connect the two pushrod sections with a short length of brass tube, after aligning controls, and solder firmly. Fit a booster jack socket on side of fuselage, running one wire to glowplug clip and grounding other to engine lugs. Small holes are drilled through forward fuselage formers for wiring.

Fit cockpit floor (on which a dummy pilot can be mounted) and sheet top between F.4a and F.6. Plank nose between F.2 and F.3. Add cowl blocks, carve and sand to shape and sheet inside of air outlet duct. Carve intake (carburetor) fairing and fit in position on fuselage top. Cut various access holes, etc. in cowl (for needle valve stem, glowplug, exhaust) to suit motor installed.

Make dural tailskid (or, if preferred for unassisted take-offs, a looped steel wire type) and screw to hardwood block. Cement block between sides below former F.6. Sheet bottom of fuselage. Fit fin and soft balsa fairing block over stabilizer and rear end.

Add wing root fillets and sand entire structure smooth. The ship is now given one coat of clear dope, and lightly sanded, after which it is entirely covered with *Silkspan* doped on.

The original was then given a further coat of clear dope, sanded, two coats of automobile primer brushed on, and again lightly sanded. This was followed by one coat of colored dope and rubbed down. After this, cockpit former F.3a was fitted, followed by three canopy sections. At this time also any other fitting can be done, such as soldering on wheel retaining washers, to avoid unnecessary handling after final coat.

To finish off, give another coat of colored dope (more if required to cover primer after polishing) and rub down with wet-and-dry paper or rubbing compound. Wipe off clean and add racing numerals or decals. The original had all lettering, etc., hand painted on. Finally, fuel proof all over and give an extra coat of proofer inside cowl.

Pen Pals

Casimer Pawlak, 4749 E. 85 St., Cleveland 25, Ohio, is interested in planes of 1903-1926 . . . Allen S. Brown, 252 Princess St., St. John, N. B., Can., wants magazines to add to his collection . . . P. G. Guhb, 13 Manor Ave., Crosby, Liverpool 23, Eng., will exchange English magazines for M.A.N. . . . Al Maitner, 190-20 109 Ave., Hollis 12, N. Y., will swap a new Forster 29 glow rotary disk engine for a K & B 19 rotary valve glow, O & R 19 or 23 R.V. glow . . . J. Williams, LAC, 4047720, 751 Signals Unit, RAF, El Firdan, M.E.A.F. 10, Eng., will trade British engines for American . . . Ward Van Duzer, Carson Long Institute, New Bloomfield, Pa., will exchange an Arden .099 for an OK Cub .074 or .099 . . . Mark Seligman, 1212 E. 23 St., Brooklyn 10, N. Y., wants to exchange his Cub .49 for Jetex 150 . . . Rex Mangin, 12 Grady St., Blenheim, N. Z., wants to swap kits, motors, is interested in control line stunt, speed, team racing . . . E. M. Clark, 221 Nassau Blvd., Garden City, L. I., N. Y., will trade motors and kits . . . so will Keith Ridyard, 71 Kenilworth Rd., Sale, Cheshire, Eng. . . . Bryan Spruce, 53 Monash, Dee Why, N. S. W., Australia . . . And Anton Zichar, Box 451, De Pue, Ill. . . . who is interested in race cars . . . Tommy Rainey, Gorman, Texas, has an .006 cu. in. diesel for sale . . . Donald R. McDonald, 3420 Federal, Everett, Wash., will sell his Brown Model D engine . . . R. Pask, 29 Hawthorne Dr., Shadwell Lane, Moortown, and G. N. Tatty, 37 Sutherland, both of Leeds, Yorks, Eng., are interested in free flight gas and glider. . . . T. G. Ogden, 3034 37 Ave., Bronx 55, N. Y. is interested in scale free flight and CO2. . . . Jan Carre (18), Bronkhorststraat 16, Amsterdam Z. I., Holland, likes scale free flight and control line. . . . B. J. Humphreys, Jr., 6330 W. 96 St., Los Angeles 45, Calif., likes jets and guided missiles. . . . Arthur Guttmann, c/o Gersti, Somerset House, Davos-Platz, Switzerland, is interested in control line and gliders. . . . Bruce Sigler (16), 7 Grand Ave., Middletown, N. Y., wants to write to someone in Mexico. . . . Bob Tannenbaum, 461 Ft. Washington Ave., N. Y. 33, N. Y., wants to contact those interested in helicopters. . . . Mike Knudson, Clifford, No. Dak., is interested in free flight, payload and controline sport.

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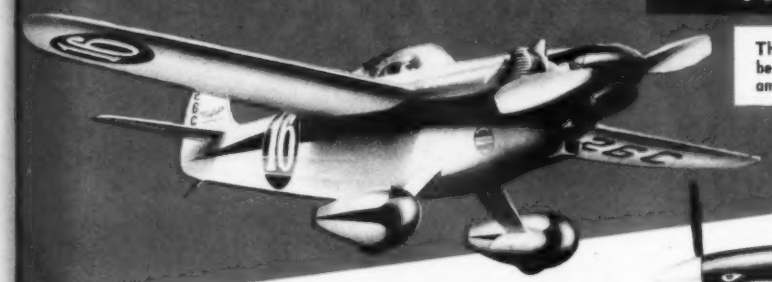

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1½" Scale *Controliner*

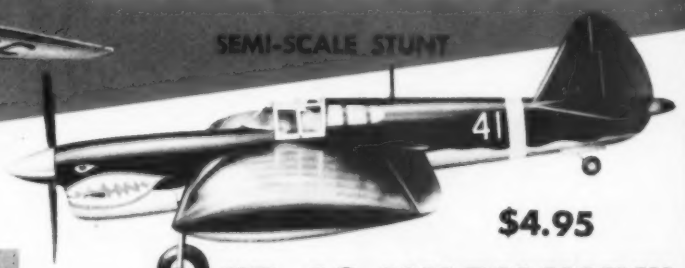
For .14 to .36 Engines

28⅜" Wingspan

$5.95

Complete Metal Hardware including Wheel Pants; Spinner; Apple Cheek Cowls; 1-piece Spring Cantilever Landing Gear; Complete Control Mechanism.

PLUS: — Plastic Bubble Canopy; Metal Bushed Rubber Wheels; Covering Material; Plywood Firewall; Hardwood Motor Mounts; and Complete Full Size Plans with Step by Step Construction Details as only *Berkeley* supplies!



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"P-40 WARHAWK"

For .19 to .35 Engines—45" Wingspan

Featuring: **METAL COWL — FLYING TIGER DECALS - STUNT FLAPS**

Kit Includes: Pre-fabricated balsa parts; Complete Metal Hardware; Covering Material; Wheels; Die-Cut Celluloid Canopy!

Cessna L-19 "BIRD DOG"

1 — Free-Flight "½A" Gas Power — 36" Wingspan—1" Scale
2 — Free-Flight Rubber Power — .035 to .049 Engines—Free-Flight
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Precision Die-Cut Balsa; Shaped & Notched Trailing Edges; Formed Wire Landing Gear; Rubber Wheels; Authentic Fuel Proof Decals; Full Size Detailed Plans.

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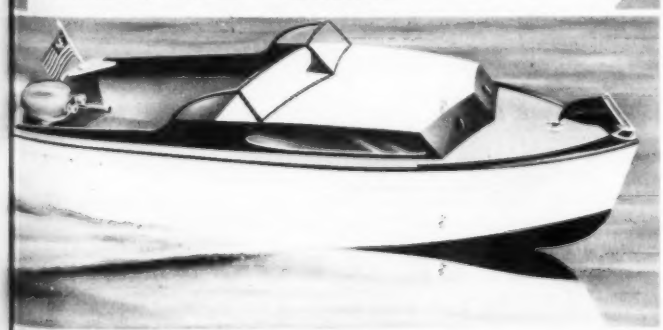
N.A.C.A. "Long Planing Hull"

"½A" "PRIVATEER" FLYING BOAT

Hull is built-up pre-fabricated sheet balsa construction with no complex curves to bend. Fuselage, sponsons, wing and stabilizer are of self-draining design. Die cut celluloid windshield, die cut balsa parts. METAL MOTOR MOUNT AND NACELLE.

.035 to .074 Engines
36" Wingspan



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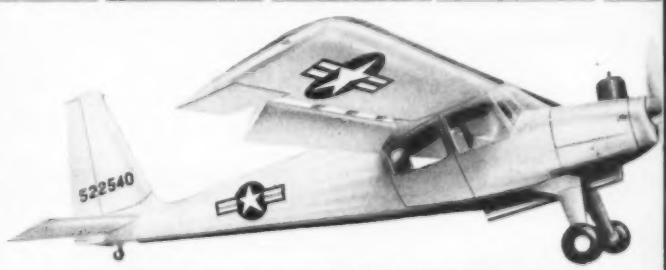
"OUTBOARD EXPRESS CRUISER"

For Electric Outboard & Inboard Engines
18" Long— 1" Scale

The ideal kit for the new model electric outboard motors, or an electric inboard motor. Designed from factory plans, authentic down to the special "Chris-Craft" decals.



Army Liaison YL-24 "HELIOPLANE"

Variable Camber Wing for Two-Speed Radio Control Flying!

$3.95 For .049 to .14 Engines — 38¾" Wingspan—1" Scale

Slotted flaps may be depressed 10° for free-flight; depressed 25° for slow speed radio control flying; or raised 5° for high speed radio control flight.

Here is the model designed to use radio control devices that will be available in the next few years. The Helioplane is the first model that permits the use of the scale flaps giving true two-speed flight.

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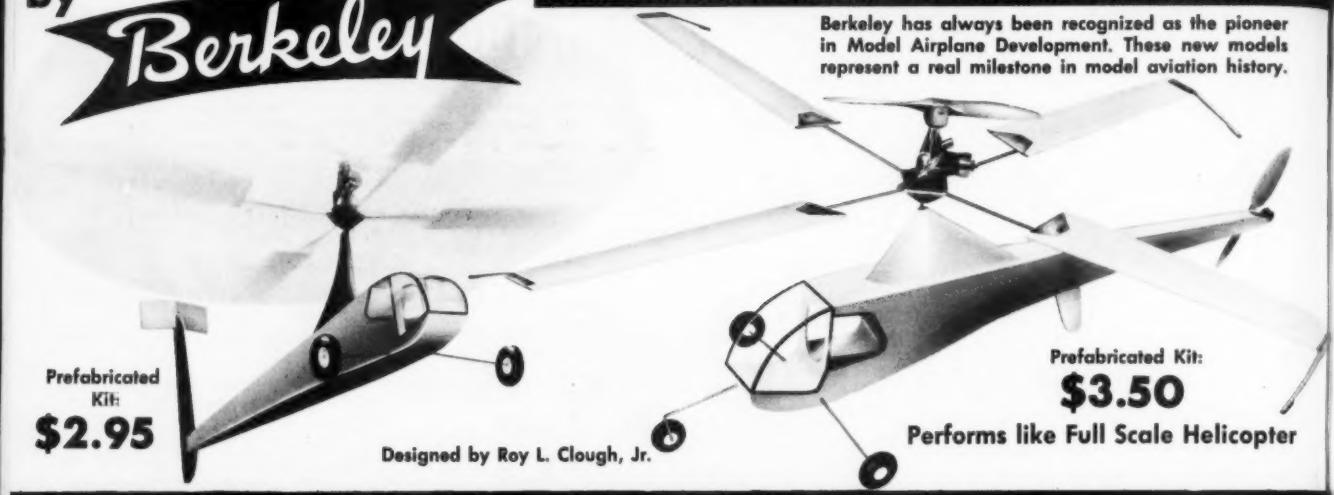
CLIMB VERTICALLY — HOVER — FLY FORWARD OR BACKWARD

Berkeley has always been recognized as the pioneer in Model Airplane Development. These new models represent a real milestone in model aviation history.



Prefabricated Kit: **$2.95**

Designed by Roy L. Clough, Jr.

Prefabricated Kit: **$3.50**

Performs like Full Scale Helicopter

CLOUD-COPTER "D"

with Fixed Drogue Tail

For .045 to .074 Engines — 26" Rotor Span

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with Adjustable Pitch Tail Rotor

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Complete Metal Rotor Mast Assembly; Metal Blade Holders designed for quick replacement of blades; Metal Blade Balance; Engine Shock Mount; Shaped Rotor Blades; Die-Cut Sheet Balsa fuselage; Wheels; Die-cut Celluloid Windshield.

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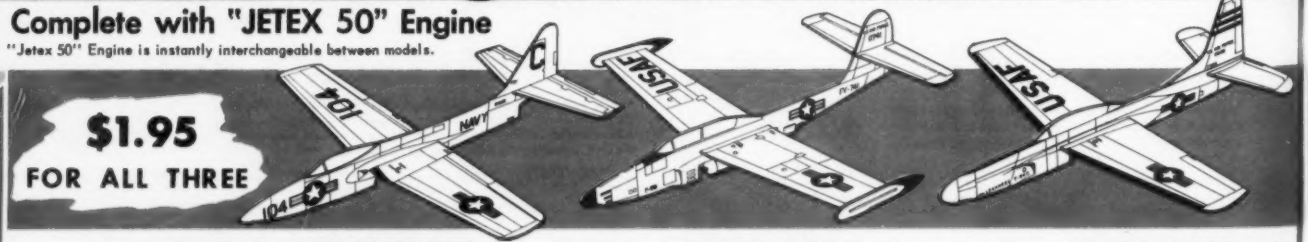
Complete with "JETEX 50" Engine

"Jetex 50" Engine is instantly interchangeable between models.



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Famous carrier-based fighter used by Navy and Marines in the Korean War.

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All-weather interceptor with terrific climb, for searching radar equipment.

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A Deluxe Advance Design Rubber Powered Wakefield Model!

51" Wingspan — 210 Sq. " Wing Area — 8.113 Oz. Total Weight.

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THE KIT INCLUDES: Specially selected Balsa throughout; special Hardware for the Folding Propeller; Milled-Shape Balsa Propeller Blank; Covering Materials; and extra-complete Plans and Instructions.

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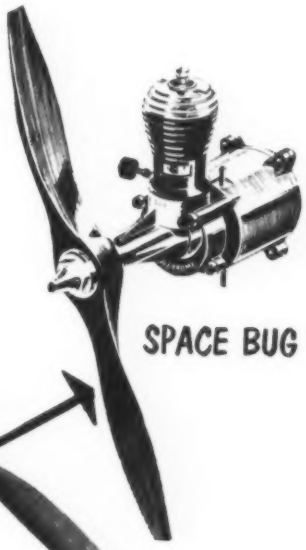
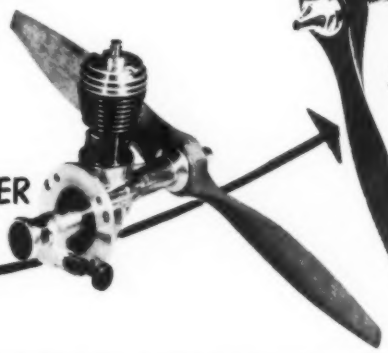
If it's top pulling power at high speed
or top pulling power at low speed
or top R.P.M.
or easy starting
or advanced engineering
or right and left hand rotation
or trophies
or if it's a combination
of any or all of these
you want—try
THIMBLE DROME





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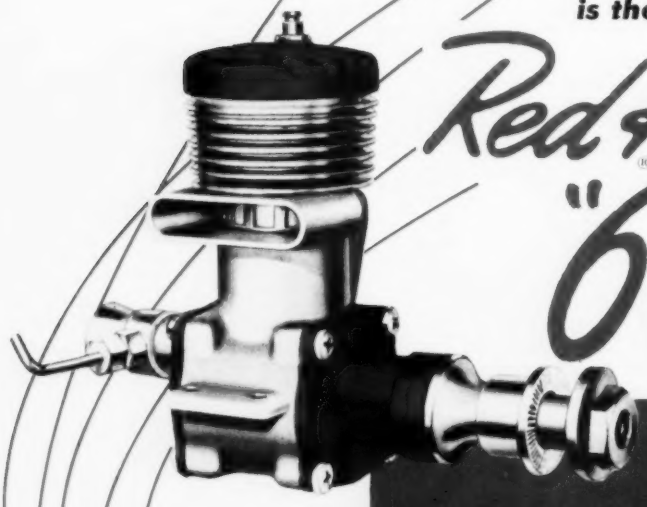
THE SKY'S FULL OF McCOYS!

...and hottest of all is the invincible

Red Head® "60"



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- New high compression head for advanced fuels.
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- Aluminum piston, two rings, fitted to honed sleeves. Crankshafts are hardened and ground to precision tolerances.
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Bore	.940"
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Displacement	.6072"
Weight in ounces	13.5
H. P. Rating	1.32 at 17,000

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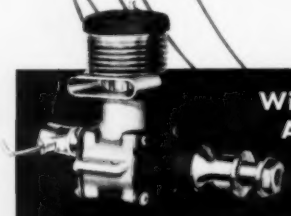
Redesigned, the *new, improved* "60" has features that prove it more remarkable than ever. Special alloy pistons for maximum performance on modern nitrated fuels. Matched outboard and front plate bearings, precision construction, power packed. No wonder it is known as the "world's fastest racing engine." Class D winners want the 60... you'll want it too.

Glo-ignition **$22.50**



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The most popular among racing engines, completely new. You'll thrill to its great performance. New, larger by-pass area, hardened steel sleeves, steel shimmed rotor valve, with front plate and two ball bearings. A honey...

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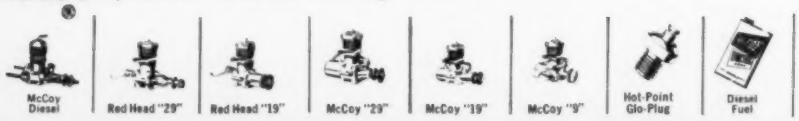
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